Products Finishing

FRED W. VOGEL, Editor

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Gleanings From War Production Board Reports

ORDER M-95 provides that rhodium, used to impart a non-tarnishable finish to such articles as compacts and cigarette cases, may not be used from now on for that purpose, but an accompanying letter from the Director of Industry Operations authorizes jewelers to use up their present stocks. Stocks must not be replenished, however.

THE War Production Board has banned the production after May 31st of metal household furniture, covering a wide variety ranging from tables and chairs to mirror frames and shoe racks, and has put into effect drastic limitations on the manufacture of such products for the interim period under General Limitation Order L-62.

THE War Production Board extended the ban on use of "bright work" to all types of motor vehicles and trailers, prohibited its use in replacement parts and accessories, and placed rigid restrictions on disposal of remaining inventories under Limitation Order L-69.

ALUMINUM Pigment and aluminum paint were placed under a complete allocation system by the Director of Industry Operations. Order M-1-g requires specific authorization for the manufacture, use or sale of aluminum pigment and aluminum paint, except in retail distribution to the ultimate consumer.

CONSERVATION Order M-108 provides that oils, lacquers, enamels, resins and gums shall no longer be used as exterior coatings on cans made of tin plate or terneplate, unless the coating serves a particularly useful purpose under Conservation Order M-108.

FABRICATORS of metals were warned by the Chemicals Branch, War Production Board, to investigate every possible cleaning method other than chlorinated solvents applicable to their operations. A shortage in chlorinated solvents already exists, caused by the vast increase in metal fabricating. It is imperative, the Branch warned, that every possible cleaning method be investigated promptly so that necessary changes in method can be accomplished without serious delay in production.

TO insure adequate shellac for military needs, a limitation order is being prepared which, while it will curtail several civilian uses, will also assure adequate supplies for essential civilian needs.

Silver Plating

By V. MATTACOTTI

Hanson-Van Winkle-Munning Co., Chicago, Ill.

ELECTRODEPOSITION of silver is perhaps the earliest example of the commercial application of the principles of electroplating. It is of interest that patents granted to Ellkington and Barrat of England in 1838, which dealt with the application of the principles of electrodeposition were followed two years later in 1840, by a patent granted to Wright of the firm of Ellkington covering a process for silver plating. This patent, now over one hundred years old, is noteworthy in that it describes and gives the formula and procedure for silver plating which is almost identical with the practice of silver plating today.

Realizing the difficult task of presenting information regarding what can or cannot be done in the field of electroplating, particularly when dealing with materials which are so essential to the welfare of the nation, the author has attempted to clarify the picture for the plater who must operate under present conditions. This article is timely as we go to press and even if drastic changes are made will still be of vital interest to every electroplater.

Generally speaking, the longer an electroplating process has been carried on, the greater the varieties of solutions actually being operated. In the case of silver this is not so. The literature abounds with references to the numerous attempts made to evolve new and different silver plating baths; however almost all of these attempts have been discarded as unsuccessful or constituting no notable improvement over the old but highly satisfactory cyanide solution. Perhaps the oldest of electroplating baths, virtually unchanged in over one hundred years, it is now coming to the fore as the only solution to a good many plating problems brought about in the non-defense field by the serious world situation.

Within a brief period we have witnessed a drastic upheaval in our way of doing things. Materials, methods, and products have been subjected to such fluctuations as to leave everyone with anything but an idea of what could or could not be done. Order is fast approaching and already we, as an industry, are rather well acquainted with what we must contend with. The experiences of the past few months in the field of electroplating speak well for the caliber of the individual in this field. Changes, substitutions, new specifications, new plating procedures were literally effected overnight, only to be revised again as new rulings barring certain procedures were issued.

In this article we will try to point out a few facts concerning silver and silver plating. The subject of silver appears to be one of much importance at the moment in view of the

	1st Steel Strike	2nd Steel Strike	White	Bright
Silver	3 dwt./gal.	12 dwt./gal.	3.5 Troy oz./gal.	3.5 Troy oz./gal.
Silver cyanide cyanide	0.2 T. oz./gal.	0.8 T. oz./gal.	4.4 T. oz./gal.	4.4 T. oz./gal.
Total potassium cyanide	9.0 oz./gal.	9.0 oz./gal.	5.0 oz./gal.	7.0 oz./gal.
Free potassium	9.0 oz./gal.	9.0 oz./gal.	2.5 oz./gal.	4.5 oz./gal.
Potassium carbonate			5.0 oz./gal.	5.0 oz./gal.

Fig. 1—Table containing series of formulas and including strike solutions for plating steel suggested by Blum and Hogaboom.

orders which very shortly will bring about almost a complete stoppage in nickel plating. Silver, as we see the metal situation, may well be the only white metal left for use in the finishing of other metals such as steel, brass or diecasting.

Pure silver is the whitest of metals and because of this property and the nobility of the metal, it has found wide acceptance among all peoples since early times. Silver is not oxidized by pure air or oxygen, either in the cold or when heated. In ordinary air it tarnishes slowly and becomes coated with a thin adherent film of varying color, according to the thickness of the film. This film is composed of silver sulphide formed by the reaction of the silver and such sulphides as are present in the air. The content of sulphur compounds in air will vary in different sections of the country so that the degree of tarnishing of silver will also vary sometimes to an extent which is very noticeable.

Silver occurs in the native state and very often in large masses or chunks in Mexico, Norway, the western United States and in a few other spots about the world. These masses are often very pure but generally the silver mass is contaminated with some gold and copper. More commonly silver is obtained from ores in the form of chemical compounds which must be subjected to refining methods and processes in order to give the pure metal. Among the important ores of silver are the sulphide called "argentite," and probably the most common silver ore; the chloride also know as "horn silver;" stromeyerite or silver-copper glance. Of less importance are the ores in which silver bromides and iodides are contained. Much silver is obtained as a by-product in the refining of ores such as copper, zinc, lead, and so on.

The production of silver has been increasing steadily and will continue to increase since so much silver is obtained from the refining of ores other than silver ores. An increase in the refining of copper and of lead, for example, will lead to quite an increase in the production of silver, since much silver is contained in most copper and lead ores. The output of silver increased 10 per cent in 1940 over 1939 and was 208 per cent above that in 1933. There has been a constant increase in the excess of silver produced over silver consumed for many years and this excess accumulating has presented more or less of a problem to the industry and to governments. For example, the Treasury silver holdings on December 1, 1940 approximated 3,135,000,000 fine ounces.

Because of the increase in the output of other metals, we believe that a substantial increase in production figures for silver from 1940 on is to be expected and when added to the huge holdings already on hand, will

represent a supply of metal sufficiently large and free of the problem of priorities as to make it worthwhile for the electroplating industry to investigate. Even with the increased consumption of silver by defense industries, there appears to be more than enough in the way of excess silver stocks so that little danger of silver being allocated is foreseen.

Silver plating as already noted, is an art over 100 years old. Electrodeposition for ornamental purposes, where a pleasing white color and a substantially tarnish free surface is required, is familiar to all in such items as tableware, jewelry of various sorts, musical instruments, trophies, and items of luxury and novelties of every description. Besides these decorative uses, silver has served and is serving very well in many functional ways such as those exemplified by silver plated bearing surfaces, alloys such as silver-indium and silver-lead alloys, again for bearing purposes, the silver plating of electrical contacts and numerous other parts involving electrical instruments, and on a small scale as a very functional use, may be mentioned the work done and being proposed, involving the use of silver as a coating for cans in place of tin. The extreme range of applications of silver plating is an indication of how desirable it is to investigate the possibilities of applying silver as a substitute for other metals now no longer available.

The problems facing the plating industry are brought about by several factors. The ability of a plater to process products is limited by the scarcity of metals and supplies which are necessary for the operation of plating. During the past few months, we have seen the plater turning from substitute to substitute as materials were either restricted or made completely unavailable to him. Very often, he had no sooner succeeded in making a change than it became necessary for him to begin along new lines. The appearance of rulings ordering the cessation of certain types of plating put more or less of an end to what was becoming a very confused situation.

Conditions certainly are not better but at any rate we know with a fair degree of certainty what to look for and expect. The plating of products designated as not essential to the war effort is rapidly approaching a standstill. In many cases this is brought about by orders halting the manufacture of articles completely, in some cases by lack of essential component materials. In any event, the plater finds himself facing one of two situations — either he has no plating supplies and is unable to obtain any and therefore cannot plate items produced by his organization, or he has plating supplies but manufacture of the products of his company has been curtailed so that little or no plating is required. These statements, of course, do not apply to those engaged in the production of materials essential to the war effort.

For such concerns as are in the class of those having products to plate, said products being still plated with copper, nickel and chrome, it is recommended that they give some serious consideration to the possibility of using silver as the plate in place of the nickel which will, after the first day of April, be forbidden as a coating on non-essential materials. During the past year, restrictive orders have been promulgated concerning the use of almost every metal familiar to platers. Copper is now unavailable for most plating purposes; nickel and nickel salts will not be available shortly; other metals such as cadmium and zinc are either restricted severely or else unsuitable

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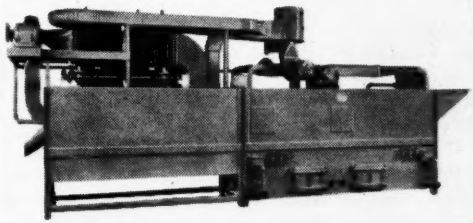

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for decorative purposes; those such as tin, while available in some extent now, are, from all indications prone to go on the very restricted list, depending on the progress of the war; finally, the use of chromium plate alone in the usual thicknesses on steel or brass, is not recommended as good practice in either normal or abnormal times.

Such a quick glance over the metal situation makes it apparent that little choice is left but to give silver, the only metal at present available, very serious consideration. On the premise that the government will permit the continued manufacture of many non-essential items for repair and maintenance purposes, as well as in those cases where it is deemed expedient that certain types of luxury items be produced, the use of a silver plate is advocated as a possible answer to finishing problems involved.

While it is obvious that silver is not the answer to all finishing problems and that the use of silver may produce other problems in view of the characteristics of this metal, it is felt that considerable weight must be attached to the fact that silver may be the only metal available for the plating of non-essential materials. Bregman has indicated in a recent article in "Iron Age" that the use of silver plate is quite feasible in many instances from the standpoint of economics if one considers the increase in cost in relation to the cost of the complete unit rather than in relation to the cost of the plating operation alone. For example, he shows that for equal thicknesses the metal cost alone would make silver ten times more costly than nickel. A deposit of .0002 in. per square foot of silver would involve the use of 5½ cents worth of silver as against only ½ cent for the same thickness of nickel.

However, as he indicates, it is no longer a question of a fifty per cent increase in plating cost but rather a question of being able to turn out materials and thereby staying in business. The times are such that the application of the usual yardsticks of cost, and so on, can be and must be subjected to new interpretation.

Silver has been considered in the past few months as a substitute for nickel and chromium plate on items such as tubular furniture, household appliances such as toaster bodies, lamp parts, and so on. Some of the suggestions which appeared slightly fantastic a short time ago begin to seem quite reasonable today. In every case the use of silver was to be in conjunction with whatever other metals were available and, of course, suitable. Typical of some of the cycles proposed for study were the following:

1. Silver plating direct on the base metal surface with no intermediate coatings of other metals. This, of course, represents the extreme recommendation.
2. Copper plating of the base metal from the usual copper plating baths, buffing of the copper to give as pore-free a surface as possible, and silver plating to the desired thickness.
3. Copper plating as in (2), buffing of the copper, silver plating followed by lacquer, or rhodium plate, or indium plate.

The situation today is such that it is not possible to give a clear-cut interpretation of who may or may not use copper. In a limited sense, the use of copper for functional purposes is permitted but whether copper as an undercoat for silver would be considered functional or decorative must be decided not by the individual plater, but by the proper government agency. For cases in which the use of copper is permitted, it is recommended that a substantial coating

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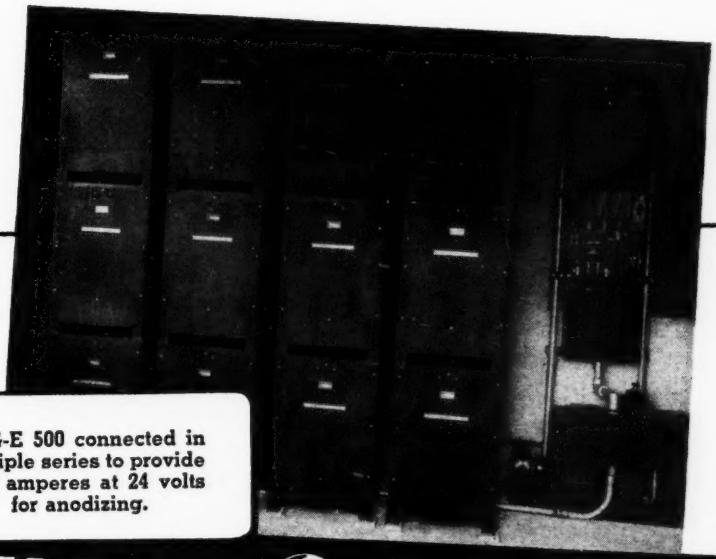

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Amps./ Sq. Ft.	.00001	.00002	.00005	.0001	.0002	.0003	.0004	.0005	.0006	.0007	.0008	.0009	.001
	THICKNESS OF SILVER DEPOSIT IN INCHES												
	TIME REQUIRED FOR DEPOSITION OF ABOVE THICKNESSES (IN MINUTES)												
1	3¾	7⅓	19	37	74	110	147	184	220	257	294	330	367
2	2	3⅔	9	19	37	56	74	92	110	130	148	167	183
3	1-1/6	2⅓	6	12	25	37	49	61	75	86	98	120	122
4	1	2	4½	9	19	28	37	46	55	64	74	83	92
5	¾	1½	3⅔	7⅓	15	22	30	37	44	51	59	67	73
7	½	1	2½	5	10½	16	21	26	32	37	43	49	52
9	⅓	5/6	2	4	8	12	16	21	25	29	33	37	41
15	—	—	1	2⅓	5	7	10	13	15	17	19	22	24
Grms./ Sq. In.	.00172	.0035	.0086	.0172	.0344	.0516	.0688	.0861	.1033	.1205	.1377	.1550	.1772
	APPROX. COST OF SILVER PER SQ. FT. (METAL COST ALONE BASED ON MARKET PRICE MARCH 2, 1942)												
	0.3c	0.6c	1.75c	3.3c	6.6c	10c	13.3c	17c	20c	.24c	.27c	30c	34c
	COMPARATIVE COST FOR SAME THICKNESS NICKEL												
	—	—	—	0.2c	0.5c	0.8c	1c	1.3c	1.5c	1.8c	2c	2.25c	2.5c

of copper be applied, for example in the neighborhood of .001 in., and that this coating be buffed to reduce the porosity of the surface to a minimum.

The buffed copper after cleaning, may then be plated with as little silver as .0001 in. to give a coating very satisfactory for many purposes. The copper will afford the protection to the base metal and the silver serve as a decorative coating. Where wear such as is given to an article of furniture is encountered, greater thicknesses may be applied commensurate with the value of the article and the wear resistance desired. Since, in many and perhaps most instances, it may well be that no copper will be permitted and since no nickel will be plated after April 1, 1942 on non-essential items, we can expect the tendency to be toward the silver plating of steel or brass directly as given

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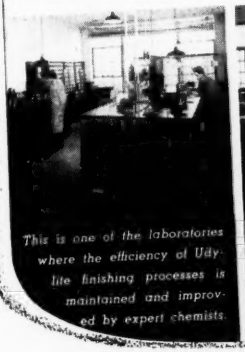

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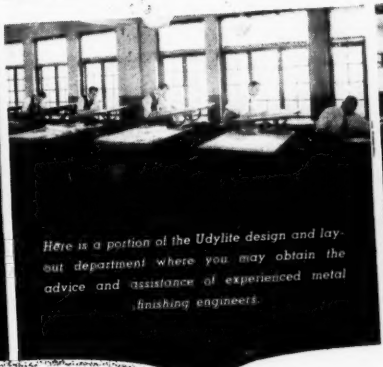

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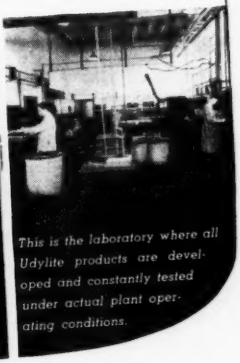

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The use of tin or lead undercoatings prior to silver plating on steel has been proposed but events of the past few weeks make it appear advisable to look upon tin as a metal whose use will be increasingly limited henceforth. Lead undercoatings present difficulties from the standpoint of solution operation, the characteristics of the metal, such as its softness and low melting point, and, of course, possible restrictions owing to the increased demand for lead in other fields. Based on the experiences of the past year, it seems wise that silver be considered an available metal now and for some time to come and perhaps the only metal whose use will be permitted for such non-essential plating as will remain.

Silver plating is carried out in solutions which are essentially composed of silver cyanide, sodium or potassium cyanide, sodium or potassium carbonate, and a brightener which in most cases is a carbon disulfide product. The anodes may be pure silver or may be insoluble type anodes such as iron or carbon, or as is often the case the anodes are both soluble and insoluble. In the latter case, a percentage of the anodes will be iron and the remainder silver. The proportion of iron to silver is carefully balanced so as to maintain the proper amount of silver in solution. The solutions are operated in steel tanks or in rubber lined steel tanks. Coils may be, and often are provided for the purpose of heating or cooling the solution as is required.

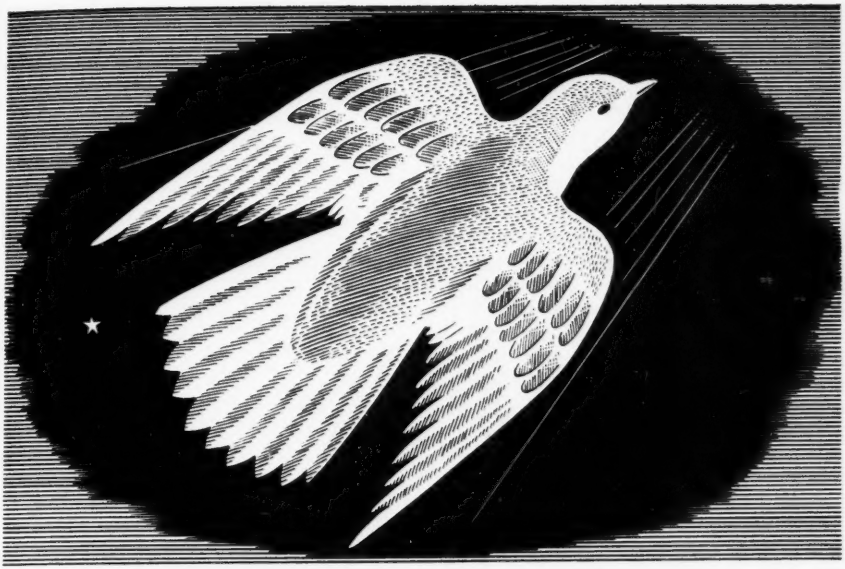
Cathodic agitation is recommended for optimum results and is generally practiced for the purpose of using higher current densities. Where necessary, it is quite possible to use mechanical equipment such as plating barrels of the oblique or horizontal type for the plating of small parts not suited to racking. Current densities of 5 to 15 amperes per square foot are customarily employed with rates up to 30 amperes per square foot in special cases. As a matter of academic interest at the moment we may mention the fact that current densities as high as 800 amperes per square foot with a cathode efficiency of 60 per cent have been attained in special instances in laboratory studies of silver plating baths. In general, we may say that the current density range will be between 5 to 30 amperes per square foot depending on the conditions characteristic of the bath being used.

Numerous formulas are given in the literature for silver plating solutions, of which the following is typical of general practice.

Silver	3-4 oz./gal. (Troy oz.)
Potassium Cyanide	4-6 oz./gal.
Potassium Carbonate	4-12 oz./gal.
Carbon Bisulphide	up to .0001 fl. oz./gal.

Sodium cyanide and carbonate are often used in place of the corresponding potassium salts for economic reasons; however because of the superior properties such as better throwing power, possessed by a solution containing potassium salts, it is recommended that potassium salts be used.

A few years ago, a noteworthy addition to the art of silver plating was made when the solution proposed by Wood was introduced. This solution, representing one of the few innovations in the way of silver plating solutions, has been gaining favor slowly and can be said to be well beyond the trial stage. A typical Wood silver bath is composed as follows:



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Silver	2-2.5 Troy oz./gal.
Free Sodium Cyanide	2-3 oz./gal.
Sodium Carbonate not over	3 oz./gal.
Potassium Nitrate	15-20 oz./gal.

The solution is used as one would use the customary silver plating solution with the exception that the Wood bath is capable of operating satisfactorily at current densities above those employed in ordinary silver plating so that if one desires, as much as 30 amperes per square foot may be applied. The silver deposit from this solution is much whiter than that obtained from other silver baths.

Blum and Hogaboom give a series of formulas including strike solutions for plating steel, which are reproduced in Fig. 1 as being typical of what will be needed by the plater in the way of solutions for the successful deposition of silver direct on steel.

Steel is cleaned in the usual manner, then given a strike in the first steel strike at current densities as high as a hundred amperes per square foot. This permits the deposition of a very thin electrodeposit of silver for, owing to the small amount of silver in the solution and the very high free cyanide, the efficiency at the cathode is very low. The object of preventing deposition by immersion is, however, accomplished by virtue of these very factors and hence peeling of the subsequent silver plate is reduced to a minimum.

The work after being struck in the first strike solution is transferred to a second strike which is a little stronger silver containing solution. Here again, after a few seconds, the work is transferred to the regular white plating solution or to the bright plating solution as desired. Plating is continued for the length of time desired under standard conditions such as room temperature, a current density of 5 to 10 amperes per square foot, and moderate cathode agitation. The proper thickness of silver plate will be determined for each individual case by the plater who will know the conditions his plate must withstand.

The application of silver direct to steel would normally not be very common practice since either copper or nickel or both would be applied as intermediate coats. Normally, the proper cycle would be one of the following and if any of the materials in these cycles are again made available, we recommend that such a cycle be followed.

1. Silver plating steel.
   - A. Clean steel.
     1. Degrease in solvent degreaser.
     2. Alkalai clean in electric cleaner.
     3. Rinse thoroughly in warm and then cold water.
     4. Remove oxides in suitable acid dip such as hydrochloric acid 10-20 per cent.
     5. Rinse thoroughly in cold water.
   - B. Copper flash in cyanide copper solution.
   - C. Nickel plate in regular Watt's nickel solution.
   - D. Nickel buff.
   - E. Clean in alkaline cleaner.
   - F. Silver strike.
   - G. Silver plate.
   - H. Buff silver (or satin finish or any other finish desired).
   - I. Lacquer to protect against tarnish.

The same cycle with these changes:

- A. Same cleaning as above.
- B. Heavy copper plate.
- C. Buff copper.
- D. Clean in alkaline cleaner.

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In current practice, steel parts which are to be hardened only in certain areas require considerable preparation before heat treating. First the pieces are copper plated. From the plating cycle the parts are trucked to a grinder where the plating is removed from the portions to be hardened. The parts are then trucked to the heat treating furnace.

This procedure can be simplified and the grinding operation entirely eliminated through the use of a specially developed Miccro Supreme Stop-Off Lacquer. In this simplified method, the pieces are coated with Stop-Off Lacquer on the areas to be hardened before they are plated. The lacquer is removed from the plated pieces and they are ready for heat treatment without further preparation.

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E. Silver strike.
F. Silver plate.
H. Same as above.
I. Same as above.

2. Silver plating of brass.
   A. Bright dip in regular brass bright dip solution.
   B. Clean in electric cleaner.
   C. Nickel strike.
   D. Silver strike.
   E. Silver plate.
   F. Finish as desired.

Another cycle for brass to give a better quality finish:
   A. Buff brass to proper finish.
   B. Clean in regular way.
   C. Nickel plate.
   D. Nickel buff.
   E. Clean.
   F. Silver strike.
   G. Silver plate.
   H. Finish as desired.

3. Silver plating of die cast metal.
   A. Clean in mild alkaline electric cleaner.
   B. Copper flash.
   C. Nickel plate.
   D. Nickel buff.
   E. Clean.
   F. Silver strike.
   G. Silver plate.
   H. Finish as desired.

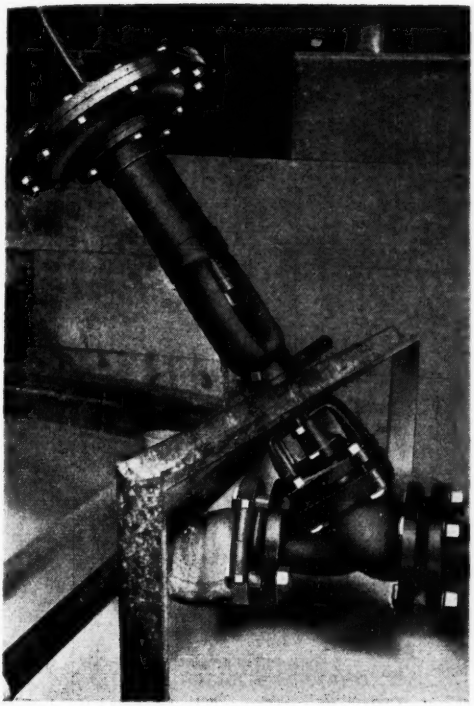
Another method applicable to die cast metals:
   A. Clean.
   B. Copper plate.
   C. Copper buff.
   D. Clean.
   E. Silver strike.
   F. Silver plate.

In all of these cycles, it will be noted that use is made of other metals as intermediate coatings having for their purpose the protection of the base metal against corrosion and the silver acting solely as the eye-appeal or decorative agent. This means that very thin deposits could, if so desired, be used; for example, steel could be plated to a thickness of .001 in. with copper and the copper then buffed to give a very smooth and pore-free surface. A flash of nickel could then be applied to provide a white undercoat or background and over this a deposit of silver of not over .0001 in. at the very most.

Today and for some time to come, it may not be possible to rely on copper or nickel for non-essential plating and thus we can only consider the application of silver plating direct on steel. This means simply that where silver is going to be used on steel enough must be put on to serve both as a protector against corrosion as well as an attractive eye-appealing surface. Such deposits may well reach a thickness of .001 in. to provide the required amount of metal for a good buffing job and still leave enough to afford reasonable protection to the base metal.

Since, as has been said, silver is prone to tarnish in most atmospheres, it is necessary that some provision be made to protect the silver where desired. Constant use of a silver plated object such as is given to cutlery will make it unnecessary to provide against tarnish since the tarnish is worn off in service almost as fast as it is formed. On objects where abrasive wear conditions are mild, such as picture frames, the use of air drying lacquers or baked synthetics of clear color is recommended. On objects where severe tarnish and wear conditions exist, it may be advisable to use either rhodium or indium deposits over the silver as protecting agents.

Rhodium has been used for years in the form of a thin electroplate over silver both because of its resistance to wear and its resistance to tarnish. The use of indium is relatively new and yet considerable indium plating is being done in conjunction with silver for both decorative and functional purposes. Indium is a metal similar in some re-



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Other installations have been made with remote control for filling acid carboys from distant storage tanks.

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spects to aluminum and zinc. It has a color between chromium and silver, it is very soft and possesses a low melting point. When used in conjunction with silver, the amount of indium plate deposited will depend on the thickness of the silver undercoat.

For example, for protection against tarnishing a thickness of indium equivalent to 5 per cent of the silver thickness may serve the purpose adequately. The work after receiving the proper amount of silver and indium is subjected to a simple heat treatment in order to diffuse the indium through the silver. This procedure may require low temperature heating for periods up to several hours in ovens or in a suitable oil bath. The indium, being by this method diffused throughout the silver plate, protects all of the silver from tarnish—that is, as a layer of silver wears off the underlying layer will not tarnish because actually it is not silver but an alloy of indium and silver. As a final means of protecting silver plated surfaces from tarnish it has been suggested that waxing of the silver be practiced. A wax such as Simoniz can be applied to the silver surface and be reapplied as often as required.

In conclusion, it may be said that the status of electroplating of materials not essential to the war program is at best an uncertain one. Limitations and curtailment orders may in the very near future eliminate from consideration the use of all metals except silver in electroplating work—that is to say, all electroplating work other than that necessary to the national welfare. Silver appears to be available in sufficient quantities and its production is increasing at a rate greater than present consumption.

The only apparent objection to more widespread use of this metal appears to be that of cost as compared to other metals. Methods for silver plating without the use of other deposits on steel are standard practice and involve no unusual procedures. It is suggested that some serious thought be given to the necessity for considering the substitution of silver for both functional and decorative purposes, for such metals as already are, or soon will be no longer available for plating purposes.

The author acknowledges the use of the following books and articles as sources of information in compiling this article.

1. Principles of Electroplating and Electroforming by Blum & Hogaboom.
2. A Resume of Silver Plating by F. C. Mesle Monthly Review, October 1937.
3. Silver Plating by N. E. Promisel and D. Wood, Am. Electrochem. Soc. Preprint 80-35.
4. The Silver Plating of Hollow Ware, E. G. Egeberg & N. E. Promisel, Products Finishing, April, 1937.
5. Silver to Replace Nickel and Chromium Plating by Adolph B. Bregman, Iron Age (series of articles November, 1941 on).
6. F. K. Savage, Silver Plater's Review, February, 1942.
7. F. K. Savage, Private Correspondence.

Porcelain Enamel Institute Sixth Annual Forum Proceedings. The Porcelain Enamel Institute has announced the publication of the proceedings of the Sixth Annual Forum. Copies of this publication are available from the Porcelain Enamel Institute, 919 New York Ave., N. W., Washington, D. C., at $2.00 each. A complete set of the proceedings of the six forums to date is available at a cost of $5.00.

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How Is the Infra-Red Finish Baking Process Aiding War Effort?

By PAUL H. KRUPP
The Fostoria Pressed Steel Corporation, Fostoria, Ohio, U. S. A.

ONE of the troublesome "bottlenecks" in industry today has been finishing. Not necessarily only final finishing is in mind, but the finishing of various parts prior to assembly or fabrication. In many instances, this problem has been solved by the application of the Near Infra-red process — one of the newer industrial tools that has lent itself to such a variety of finishing problems because of its extreme flexibility.

AUTHOR'S NOTE: *Due to wartime censorship and our desire to guard any information that would be valuable to the enemy, production figures and other pertinent facts are given as generalities. However, these facts are available to industrial executives who are further interested in solving production problems by means of the infra-red process.*

Primarily, industrial plants engaged in War work and faced with finishing problems are eager to adopt a process that can utilize part of present equipment, solve the problem, and still be a valuable tool for peace-time operation. Of course, when this goal is reached, the desirable condition of flexibility has been achieved.

Willys - Overland was confronted with a finishing problem recently and turned to the Near Infra-red process to help them finish U. S. Army Scout Cars — "Jeeps." They found that their former equipment could be transformed into a modern Near Infra-red baking and drying tunnel very easily, in record time, and without seriously changing production methods. A steel framework to support 2,000 reflectors was set up in the 185 ft. tunnel in four days. A view of this tunnel is shown in Fig. 1. During the finishing operation a spray operator stationed at one end of the tunnel sprays the chassis and frames with a heavy coating of olive drab lusterless enamel. The motor and various mechanical parts have already been mounted.

The "Jeeps" pass through the first 90 feet of the baking zone and are then sprayed with a second coat, continuing on through the tunnel. These chassis are ready for additional as-

sembly immediately upon emerging. Masking shields are provided over various parts which should not be painted.

The first section of the radiant energy zone is provided with 375 watt lamps for a distance of 12 feet and 125 watt lamps for the remainder. The extra wattage is beneficial for the first section and speeds drying materially. The last section of the tunnel, or the part which bakes the final coat, is provided with 250 watt lamps for 12 feet and 125 watt lamps for the remainder. It is possible to use only 250 watt lamps for the final baking operation because the metal has been already built up to a considerable temperature, and after the final coat spraying is still around 125 to 150 deg. F.

The entire job was engineered to properly process the finish with the conveyor moving at a speed of 6.5 feet per minute. At the present time, the speed has been stepped up considerably, thus baking the finish in shorter time and producing more cars per hour.

Willys engineers say they expect to step up production to a still higher point using present equipment. It will be possible to do this by merely using higher wattage lamps throughout the tunnel. This possibility was considered when installing, and adequate wiring was used accordingly.

The tunnel requires no preheating prior to operation. Consequently, when the switches are turned on and the chassis have been coated, the entire unit operates with the same beneficial baking results as if in constant operation. Radiant energy's quick-heating action means that the process can be shut down for lunch periods or stoppage in production line with no stand-by loss of energy.

Another example of how radiant energy speeds the quick drying of

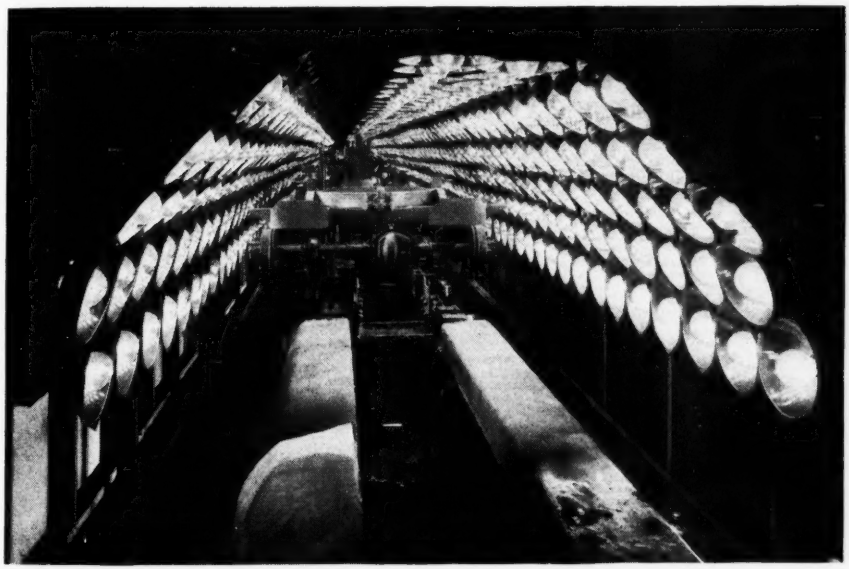

Fig. 1—Illustration showing the set-up for baking two finish coats on the chassis of U. S. Army Scout Cars. This is a 185 ft. tunnel in which 1990 Near Infra-red reflectors are located.

parts to enable rapid assembly of vital War industry products is demonstrated at Jacobs Aircraft Engine Corporation. Here, production schedules were being delayed by necessity of waiting for the various engine parts to dry. Floor space for air drying was at a premium. To solve their problem, a 21 ft. Near Infra-red tunnel was installed using a conveyor that moves at variable speeds of one to four feet per minute.

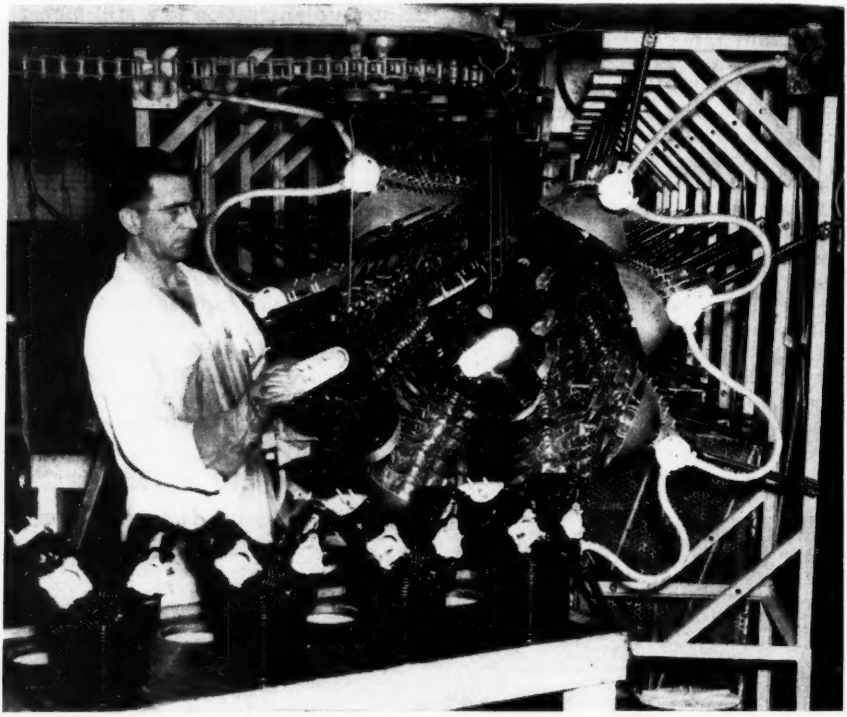

Fig. 2—Using the Near Infra-red process to bake three finish coatings simultaneously on aircraft engine parts. The conveyor carries the parts through a 21 ft. heat zone at variable speeds.

A prime coat and two finish coats of black are sprayed on the aircraft parts, allowing a short stand-out time after each spraying. All three coats are then baked simultaneously in just a few minutes as shown in Fig. 2. The intensity and penetration process of radiant energy is well demonstrated by the fact that these castings attain a temperature of 300 deg. F. during the trip through the tunnel. They cool down very quickly, however, and are soon ready for further assembly and shipment.

Welker Mfg. Co., in the East, increased drying time on gas-mask buckles to the point where it was necessary to add a packing and shipping staff of 20 additional employees to keep pace with the Near Infra-red process. Previous to adoption of this method, the buckles were

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sprayed and then placed on trays to air dry. It required a girl to shake and turn the buckles every 15 minutes to keep them from sticking. Even then, "lacquer blushing" was common. One hour was necessary for this complete operation before they were finally dry.

Fig. 3—Small aircraft parts are sprayed and then passed beneath a flat bank of powerful infra-red lamps at Lockheed.

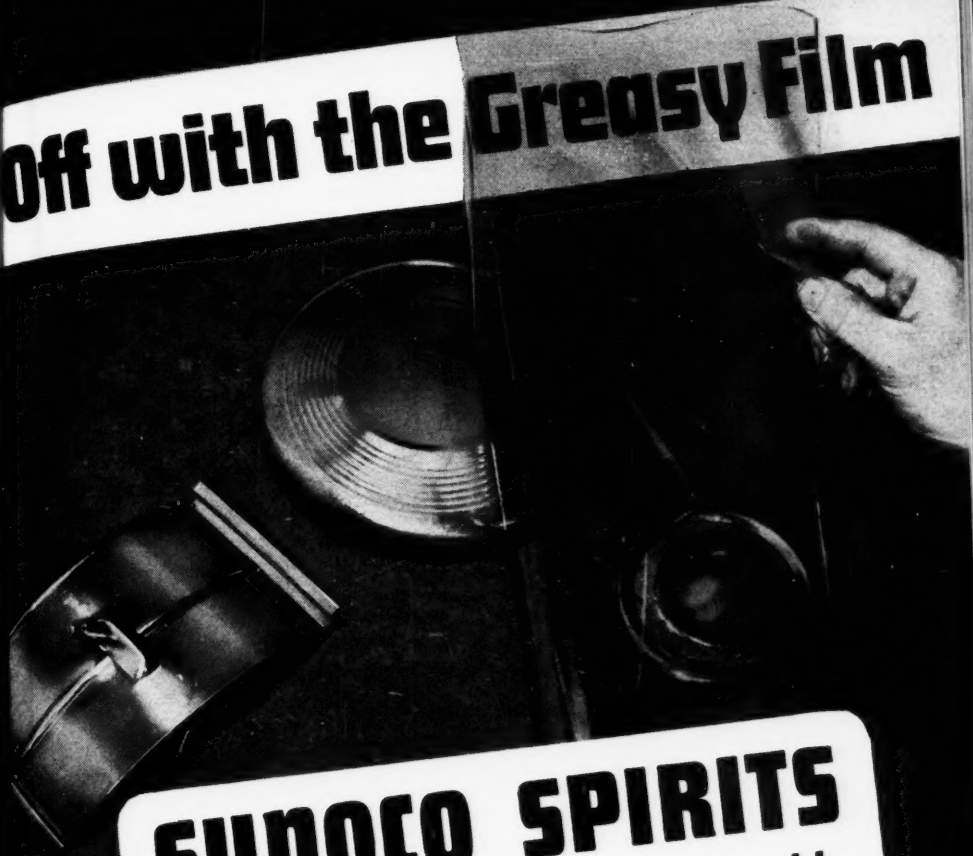
Now, after spraying, the buckles are placed on a screen 18 in. wide and placed under infra-red lamps of 260 wattage. Complete drying is effected in almost less time than it takes to tell. "Lacquer blushing" has been completely stopped and millions of the buckles are finished per month.

Pratt & Whitney has found the Near Infra-red process so agreeable and flexible to finishing problems that its application has spread from one original intended use to other departments. Six tunnel sections were first installed to bake black wrinkle finish on different sizes and types of gauges. The former method continually handicapped a steady flow of parts coming to the final assembly department and it appeared there was no remedy. The radiant energy process afforded a minimum of handling by the sprayers, no tie-up in the baking zone, and a regular flow of satisfactory parts now reach the final assembly in a minimum amount of time.

Since the swing-over to infra-red at Pratt & Whitney, foremen of various departments are now finishing many parts which formerly were not painted at all because of inability of former methods.

Such concerns as Lockheed Aircraft, Vultee Aircraft, Bendix, Square D, Bulldog Electric, Mack International Truck, Bell Aircraft, Jones & Lamson, Minneapolis Honeywell, and

Off with the Greasy Film



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many others have turned to the Near Infra-red process, because they found definite and sometimes astounding answers to a variety of problems involving baking, drying, dehydrating, and preheating. A view of an installation at Lockheed is shown in Fig. 3 and one at Bendix is shown in Fig. 4.

In many cases, industrial plants have found that this new process equipment could be suspended from the ceiling, thus saving valuable floor space. This was the case with Knapp-Monarch Co., St. Louis, manufacturer of therma-jugs. In addition, the process has increased production 12 times so that this firm now produces 450 to 500 jugs per hour.

In many cases there are desirable advantages that apply to infra-red installations regardless of the applications involved. For instance, it is possible, at all times, to inspect the product since all parts are visible and the process can be stopped momentarily without loss of energy. Infra-red baking tunnels or banks are flexible, permitting adjustment to a variety of sizes and shapes to accommodate varying products.

Today, an industrial plant may need equipment for paint baking purposes. One year from now it may have a dehydrating application which can be handled equally well with few

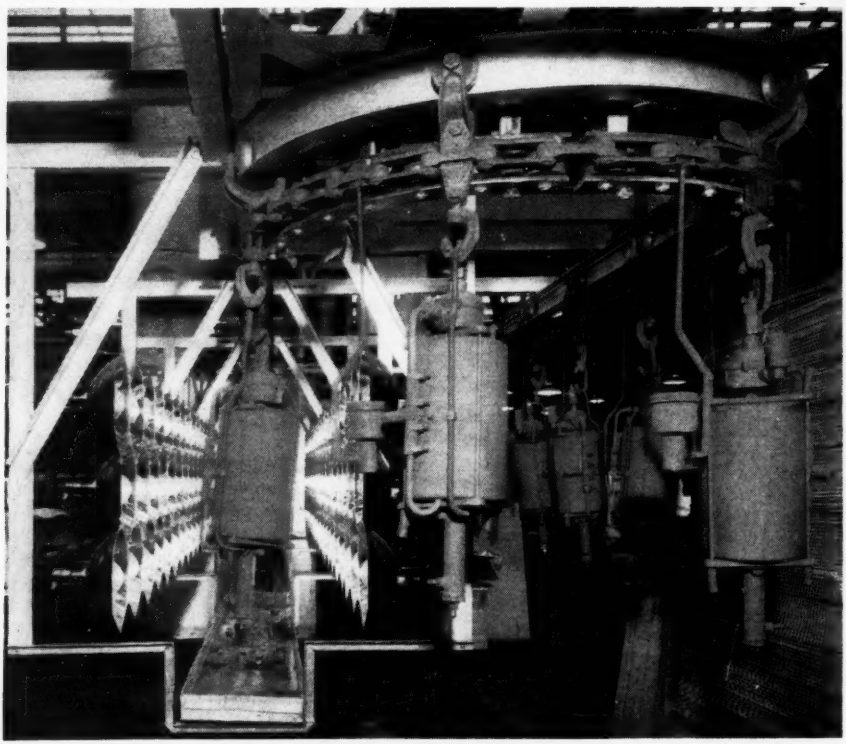
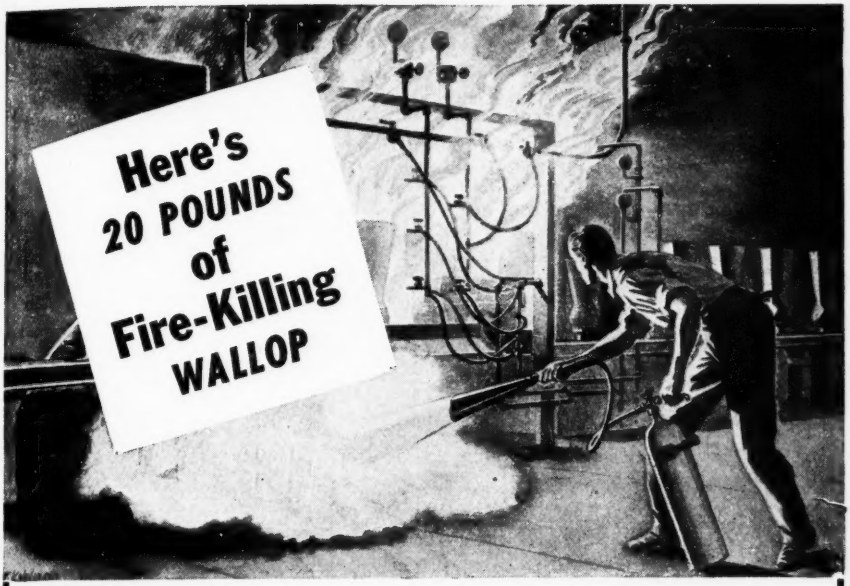


Fig. 4—This illustration shows the zinc chromate finish baking operation on hydrovac cylinders and air cleaners at Bendix Mfg. Co. plant.



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or practically no radical changes.

Quick action and penetrating effects of radiant energy obviate the necessity for preheating of ovens. The process is ready for use instantly upon throwing the switches, and can be stopped in the same manner for conveyor repairs, lunch periods, or material inspection. The Process creates no uncomfortable heat surrounding equipment, and offers no hazard problems for workmen. Equipment in many cases can be made in portable forms and rolled from place to place on casters to conform to today's ever - changing production plans.

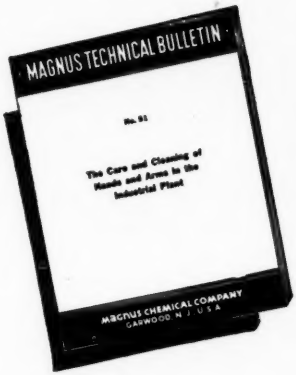
Army Saves 13 Tons of Chromium in Purchases of Soldiers' Cutlery

In the purchase of 4,000,000 pieces of flatware such as knives, forks, and spoons, the Army is substituting silver finish for chromium, the War Department announced recently. The substitution will mean a saving of approximately 13 tons of chromium, a strategic metal, according to Quartermaster Corps procurement officers.

All Army flatware is made on mild steel as the base metal, with the exception of the knife blade, which is a corrosion-resisting steel. Future purchases of knives, forks, and spoons will follow this specification, and silver finish will replace chromium finish "for the duration." The nation suffers no present or contemplated shortage of silver.

The Care and Cleaning of Hands and Arms in the Industrial Plant. The Magnus Chemical Co., Inc., 208 South Ave., Garwood, N. J., manufacturer of Hand Cleaner, industrial cleaning materials, and emulsifying agents, is now issuing a new 24-page technical bulletin entitled "The Care and Cleaning of Hands and Arms in the Industrial Plant."

The bulletin has been written and designed for use by safety engineers, industrial physicians, industrial insurance


MAGNUS TECHNICAL BULLETIN
No. 51
The Care and Cleaning of Hands and Arms in the Industrial Plant
MAGNUS CHEMICAL COMPANY
GARWOOD N. J. U.S.A.

Magnus Bulletin No. 51

men, plant superintendent, and every plant man who is interested in or concerned with the control of industrial dermatoses.

A few of the important phases in the care and cleaning of hands and arms discussed in this bulletin are: What a hand cleaner should do and what it should not do, safe detergents and scouring agents, germicides and medicants, lime scums and rinsing, cleaning routines, and protection of hands and arms on the job.

This technical bulletin should be of great assistance to industrial executives in maintaining a healthy condition of employees' hands and arms through the use of planned cleaning routines and safe hand cleaning compounds.

Copy of Magnus Technical Bulletin No. 51 may be obtained free upon request.

Defense Sampler. A wall chart containing samples of plated metals, listing typical uses for them, and illustrating by means of a graph how they can help to conserve more strategic metals for vital war production is now being issued by American Nickeloid Company, Peru, Ill. This chart will be of unusual interest to those engaged in war production and who are bidding on government contracts. Copy free.

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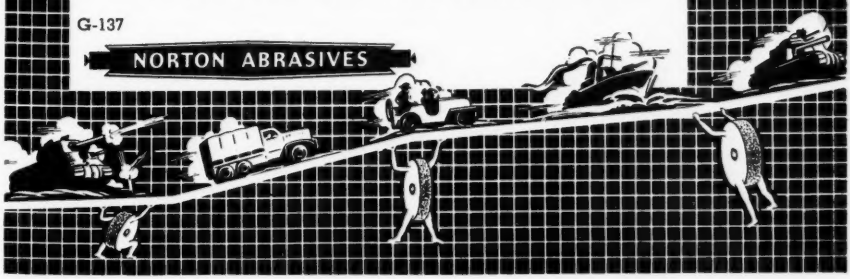

Modern Gold Plating — Part 20

By JOSEPH B. KUSHNER, CH.E.

Metal Finishing Consultant
New York City

ONE of the more interesting applications of gold plating is in the manufacture of gold leaf. The application is of interest not only from the technological standpoint but from the economic and historic standpoint as well for the introduction of modern gold plating to the manufacture of gold leaf has completely revolutionized — literally as well as figuratively—this age old art.

Gold leaf is the extremely thin and fragile sheet of yellow metal we see the sign painter remove from between the leaves of a little paper book and press to the glass when he is going about his business of lettering gilded names on store windows. It is so thin you can almost but not quite, see through it. Because of this thinness, gold leaf appears red and sometimes green when you hold it up against a strong light but when viewed by reflected light as we see it when we see a sign, it has the natural yellow color of gold. The thinness of the finest grade of gold leaf is almost unbelievable; .000005 in. or even less (.8 to 1 micron).

The origin of the art is lost in the mists of antiquity. The ancients produced gold leaf even in prebiblical times for investigations of archeologists and Egyptologists have turned up vessels and other objects ornately gilded with gold leaf, dating back as far as 3500 B.C. Gilding with gold leaf was practiced in many countries. Grecian, Roman Palestinian and Chinese specimens of gold leaf work are on exhibit in many museums both in this country and abroad.

If we can judge correctly from the earliest archeological evidence and recorded descriptions, the art has changed very little (until the recent past) in something like 5000 odd years. The steps in the method of manufacture described then are practically the same as practiced now with some slight mechanical improvements. The gold ingot was cast out then followed a beating operation with a heavy implement until the gold was suitably flattened. Sheets of flattened gold were then interleaved with sheets of copper (more recent practice is to use sheets of special paper or gold beater's skin), then beaten some more until the sheets of gold reached the desirable thinness. The only improvement in the process in some 5000 years was the introduction of machine rolling and beating in the

nineteenth century, which helped cut down somewhat on the amount of labor required. In this connection, we might mention that as late as 1930 the average daily output of gold leaf from a skilled worker was 3000 sheets, approximately 5 in. x 5 in., and according to one of the outstanding manufacturers this was the daily average per man for 50 years prior to that because as the amount of work was cut by the machines the working hours of the men were proportionately reduced.

Just to give an idea of the technique and skill required even with a modern metal rolling machine, we are going to describe the typical cycle of events in producing gold leaf by this method—which, incidentally, though obsolescent is still used to a slight extent because of the patent situation and the firm belief of old timers that gold leaf produced by this method is best—before it was revolutionized by the introduction of a gold plating method.

Manual Method of Gold Leaf Manufacture

The gold or gold alloy is first melted and cast into a series of small molds. The ingots are then rolled down by passing through a number of rolling mills until a thickness of .0008 in. is obtained. The width of the gold ribbon is then about 1¼ in. and each ribbon has a length of about 2 yards per ounce of gold. The gold ribbon is now cut into squares. These squares are stacked one on another, separated by 4 in. squares of fine vellum with a parchment covering on top and bottom. There may be from 200 to 400 gold squares in each stack. In gold beater's lingo, this stack is called a "cutch."

The cutch is now beaten with a special type of mallet weighing from

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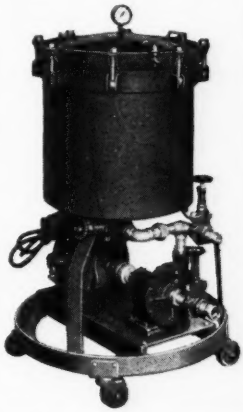

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16 to 20 pounds for ½ to ¾ of an hour. The beating bench is a block of solid marble which is handed down from generation to generation. In fact, some of these marble blocks are so well worn they actually show depressions where the workers rested

velop during this treatment and the sheets must be dried out before further treatment can be continued. After the sheets have dried out they are removed from the coarse skins with the boxwood tongs and stacked up in piles of 100 to 200 and trimmed

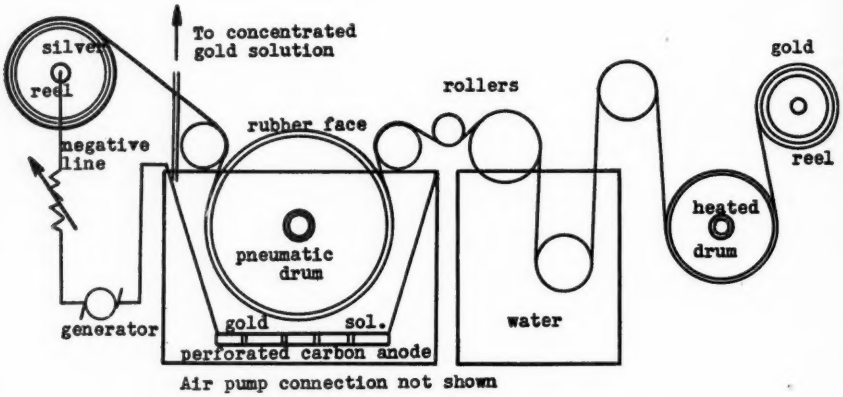

Fig. 1—Gold leaf electroplating. (After patent drawings.)

their thumbs on the same spot. After the first beating, the sheets of gold are considerably reduced in thickness and increased in area and are roughly about the size of the vellum sheets. The sheets of gold are now separated with special boxwood tongs from the vellum, and are piled up in stacks of 120 to 200 each. With a fine knife called a skewing knife, the stacks are trimmed and quartered. Now, 800 to 1000 of these quartered gold sheets are stacked up separated by layers of coarse skins about 4½ in. square. These skins are what are known as gold beater's skins, made of the outer membranous covering of the appendix of the ox, which time and experience have shown are best suited for the job.

This second stack is called the "shoder." It is beaten for 1½ to 2 hours with a 20 pound hammer. A slight amount of moisture may de-

and quartered once more. The trimming and cutting at this stage is done with a specially sharpened reed.

The fine gold sheets are then stacked up in lots of 1000 to 1200, this time separated by the finest gold beater's skins. These skins are in themselves so thin that 1000 of them are less than an inch in thickness and by weight are almost as costly as the gold. This last stack is called the "mould."

Now begins the final beating operation. First comes a beating with a 4 lb. hammer for an hour, then comes a beating with a 6 lb. hammer for ½ hour. Then comes a beating with a 10 lb. hammer for an hour and finally the mould gets a going over with a 20 lb. hammer for an hour. The gold really takes a beating. But this is not the end. Just to make sure, the stack gets a final 20 blow massage on each side with a 16 lb.

hammer. The gold leaf, which is now roughly about 5 in. square, is carefully removed from the mould and placed in alternate pages of "books," bound leaflets of fine paper tissue, and is ready for use by the trade.

In connection with the labor involved, all the beating is done by men and the remainder of the work, the delicate quartering and so forth, is performed by women. The workers have to be extremely skilled and it has been said there can be no hope of making a man a good gold beater unless he is apprenticed right from grammar school. The same holds true for the women workers.

Careful consideration of the process shows that at least 18 hours must be spent in producing a book of gold leaf. Furthermore, the labor required must be highly skilled and dextrous. Another item that offends the engineering mind is the high percentage of waste, for only about 50 per cent of the gold in the raw ingot is converted to commercially usable leaf; the balance going off as trimming and miscellaneous waste.

It was only natural that some individual on studying the production of gold leaf by this method would come to the conclusion that the process could be materially speeded up and skilled labor and losses cut to a minimum if an electroplating method could be used. This was exactly what happened. In 1877 an artisan by the name of Demel conceived the idea of plating out gold leaf, the only revolutionary change in gold leaf manufacture in 5000 years. He reasoned: "Why not deposit out an extremely thin layer of gold on a thin copper sheet, then dissolve out the copper with nitric acid?" In his original U. S. patent No. 198,209, he described just such a method. With his process, a copper tape was plated with gold then

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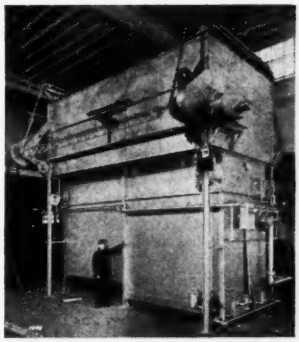

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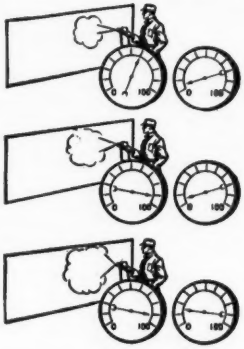
1. WATCH AIR AND FLUID PRESSURES TO SAVE MATERIALS

▶ The pressure is on America to *conserve.* In the finishing department this means *using no more materials than necessary* per unit. Actual experience demonstrates that often *twice as much* material is used when dusted away on flat surfaces through "fogging" and "overspray" due to excessive air and fluid pressures. (See chart below.)

2. HIGH PRESSURES MEAN HIGH COSTS

(Cost figures based on synthetic paint at $2.25 to $2.50 per gallon, with spray gun opened wide for an hour.)



$10.00 an hour
60 lbs. on air
6 lbs. on fluid

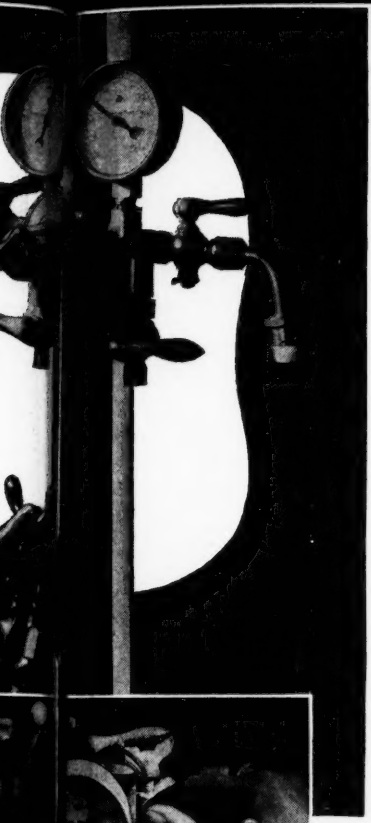
$11.50 an hour
90 lbs. on air
6 lbs. on fluid

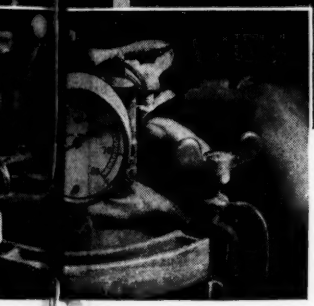
$20.00 an hour
90 lbs. on air
15 lbs. on fluid

▶ This chart graphically shows that correct pressures (60 lbs. on air and 6 lbs. on fluid for most jobs) reduce amount of material used and thus lower costs. Allow spray operators only enough fluid to get required film thickness . . . only enough air for proper atomization.

3. DETERMINE A[IR] PRESSURES

▶ Ask a Du Pont Representative, spraying equipment, to help determine pressures for particular applications. Once set, someone should be made responsible for checking pressures supplied the gun gauge for testing.





E A KEEP SUR STANDARDS

presentative, or your supplier of helps determine proper pres- pplications. Once the standard is e made responsible for constantly pplied the gun, using a pressure

CHECK THESE 11 POINTS TO SAVE MATERIALS

NEXT MONTH READ ABOUT

1. Temperature of paint
2. Viscosity of paint
3. Air and fluid pressures
4. Adjustment of spray gun
5. Handling of spray gun
6. Triggering of the gun
7. System in the strokes
8. Uniformity of coating
9. Thickness of film
10. Causes of rejects
11. Touch-up procedure

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Look for a detailed discussion of each point in this monthly series.

floated with the copper side down in a bath of dilute nitric acid, thus dissolving the copper and leaving the gold floating on top. As is usual with revolutionary ideas and inventions it did not come into use until years later and at that time a number of difficulties cropped up. The greatest of these difficulties was the most obvious one: preventing the gold from depositing on both sides of the copper tape. If a stop-off of some kind were to be used on one side of the tape, it would require that more extra time to be removed before entering the nitric bath and, improper removal might affect the action of the nitric acid on the copper.

It was not until the very recent past that a gentleman by the name of Grupe[1] thought up the answers to that one and patented it. The method to be described is now in use in the largest gold leaf plant of its kind in the country.

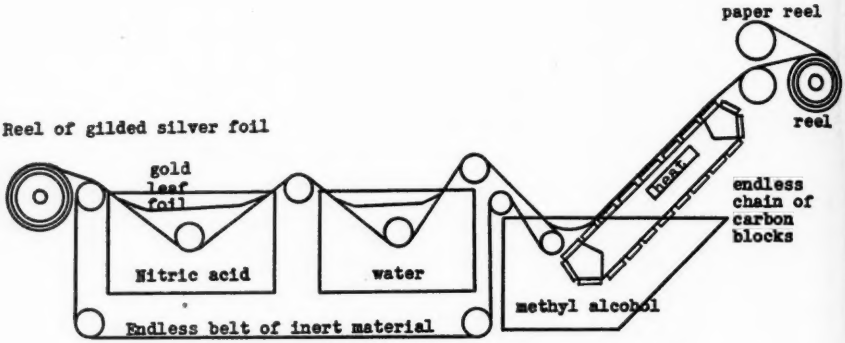

Fig. 2—Silver stripping or leafing operation. (After patent drawings.)

Manufacturing Gold Leaf by the Dynamic Electroplating Method

By this method a silver tape or ribbon, running in thickness from .0005 in. to .001 in. unwinds from a spool or reel as shown in Fig. 1 and passes over a series of rollers into the gold plating tank. Before actually coming into contact with the gold plating solution the silver tape contacts a pneumatic drum in such a way that one side of the tape is drawn up very tightly against the drum surface. The drum surface, which is made of a rubber composition or similar material permits the silver ribbon to sink by external pressure part way into it, with the result that the interface is completely insulated from the solution and does not take a deposit of gold as the tape passes around the drum and through the gold plating tank. An air pump connected to the pneumatic drum permits the pressure in the drum to be adjusted properly so as to equalize the pressure of the silver tape.

The gold plating solution runs at about a concentration of 4 grams of potassium gold cyanide per liter. The voltage employed averages 1.5 volts and the current density is close to .75 ampere per sq. ft. of tape sur-

[1] U. S. Patents 1,512,825 and 1,513,696 controlled by the Peerless Roll Leaf Co., Union City, New Jersey.

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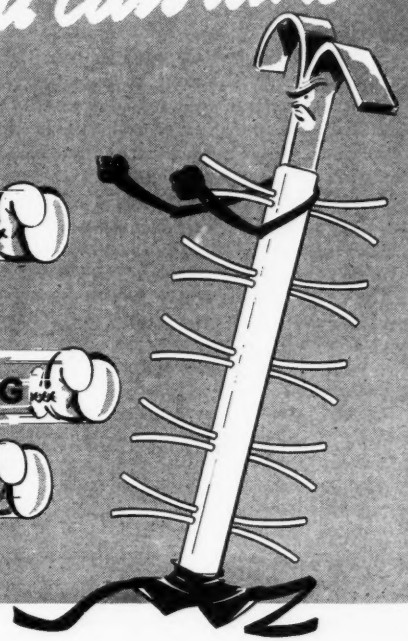
This tough coat can take it



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face. The current density and the speed of the tape through the bath are controlled to give the thickness of gold deposit desired. A perforated carbon anode is used, suspended underneath the drum. The gold plating solution is agitated by a plate that moves up and down, at a suitable rate, in the body of the solution. The gold solution, which as it plates becomes depleted of gold, is replenished continuously at a predetermined rate to maintain all chemical factors constant, by means of a dropping burette or liquid feeder that contains a concentrated gold solution.

After passing through the gold plating tank, the gold plated silver ribbon goes over another roller and into a rinse tank where it is thoroughly rinsed. From there it passes on to an internally heated drum which dries the tape. The tape is wound up on the other side of the heating drum on a suitable reel or spool or else it may pass directly into the leafing bath (silver strip).

The next stage in the process is the silver stripping operation. The gilded silver tape unrolls from a reel with the gold side up. It feeds on to an endless belt of insoluble material that passes through the nitric acid bath as shown in Fig. 2. As the tape passes through the nitric acid the silver dissolves off and the fine gold leaf ribbon floats up to the top of the bath. Under the initial impetus of the moving tape, it moves along the surface of nitric acid in the same general direction until it hits the rising continuous belt and rests on it once more. The continuous belt moves along and carries the gold leaf with it into a rinse tank where the acid is washed off the gold.

What happened in the nitric tank also happens here. The gold ribbon floats up to the top and moves along in the general direction of the endless belt because of the momentum imparted to it at the entrance of the tank. It moves along on top until it hits and rests upon the continuous belt once more. The moving belt now carries the gold leaf ribbon into a methyl alcohol tank. As the leaf floats up and away from the moving belt, it floats on to a continuous chain of flat carbon plates which carry the gold leaf up and out of the alcohol bath. Towards the top of the chain a heating unit is passed which completely dries the leaf. The leaf now feeds over a roller and on to a spool or reel. At the same time, a special paper tape feeds with the gold leaf on to the spool, interleaving with it. Thus we get gold leaf in roll form in exact size and thickness without any wastage whatsoever. The roll can be chopped up and bound into books, if desired, or used as is.

While the rate of speed for the silver ribbon moving through the system is not given in the patents it is not hard to realize that this electroplating method increases tremendously the amount of gold leaf that can be turned out per day. Whereas a skilled worker can produce only 3000 sheets of leaf per day (roughly 105 sq. ft. of surface) a machine like the one described can theoretically turn out any given sq. footage of leaf per day, the amount depending solely on the size of the machine and the conditions of operation. If, for example, a sq. ft. of silver ribbon passes through the system in a total time of one minute, in an 8 hour day, 480 sq. feet of gold leaf can be produced. This would be roughly a little more than 4 times the production of one skilled beater, but would be only a small part of the potential machine capacity. Of course, the plating method is not without its headaches.

Special means must be taken to overcome brittleness of the deposit and a few other odds and ends must be zealously watched over but all in all it can be truthfully said, here is one place where gold plating completely revolutioned one of the oldest industries in the world.

Erratum

In last month's chapter on plating stainless steel the average carbon content of a stainless steel was printed as 18 per cent instead of .18 per cent which it should have been.

"Chemicals by Glyco." A new edition of this catalog is now available through Glyco Products Company, Inc., 230 King St., Brooklyn, N. Y. It has been completely modernized in format and size, thus allowing for greater legibility, ease of handling and simple reference, and has been expanded to 112 pages, 8½ by 11 in. in size. Detailed information on polyhydric alcohol esters, emulsifying agents, special emulsions, flameproofing and waterproofing agents, synthetic resins and synthetic waxes is included in this attractive catalog.

Comprehensive tables outlining the specifications of most of these materials have been arranged in such a manner as to make this information readily accessible without the necessity of referring to the individual description of each item. Suggested formulae for the manufacture of numerous finished products and the index by industries, which has always been a useful guide to chemists, manufacturers, and technical workers, have been brought up to date and reset for better reference.

A copy of "Chemicals by Glyco" will be sent free upon request.

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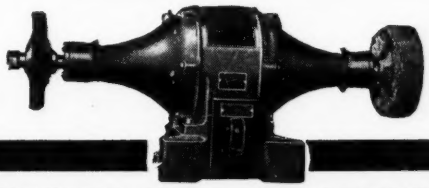

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The New "Machine Tool Gray"

By WENDELL E. WHIPP

President, The Monarch Machine Tool Company, Sidney, Ohio

HOW many colors, or shades of a single color, for today's machine tools? Once this was a matter strictly of customer preference. He could have the "standard" color, a dark machine tool gray, which had been adopted several years before by the machine tool industry, or could specify something else. Adherence to the "standard," whether by makers or by buyers of machine tools, had, as a consequence, become as much the exception as the rule. More and more customers specified a color differing in greater or less degree from the standard. Generally they asked for a lighter shade of gray.

Along with this trend of customer preference there developed a tendency on the part of the machine tool builder to finish his machine in lighter shades of color on his own initiative. All of this, of course, resulted in a multiplying of color standards. As the demand for machine tools mounted, it became increasingly difficult to satisfy this great variety of color specifications. Frequently it required the special handling of many small parts, as well as the machine itself. Thus the question of color suddenly assumed a practical as well as an aesthetic importance.

Changing the color on one machine, on a group of machines, inevitably interposed production delays. This was particularly true when the machine tool builder finished his machines with a spraying lacquer. Before a color other than the standard could be sprayed on a machine tool, the spraying equipment had to be thoroughly cleaned. Afterwards, the equipment had to be cleaned again and the original color put back in. For some light shades a different priming coat was required. All of this took time which obviously could be put to better purpose in the present emergency.

Early last fall, therefore, it was decided to re-examine the question of adherence to a single standard color and if possible to agree upon a single shade which would be satisfactory to everyone. An assortment of colors was sent to all members of the National Machine Tool Builders' Association, and they were asked to make their selection. Majority opinion was in favor of a color somewhat lighter than that which had been previously used and at the Association's October convention, this lighter machine tool gray, to be known as '7-B' was officially adopted. At the same time, no absolute deadline was set for the change-over to the new standard by the industry, it being left to the discretion of each machine tool builder

to make the change in whatever way and at whatever time suited his particular circumstances the best.

The new color standard has been based on more than strictly a preference vote. It has been subjected to a variety of practical tests. For example, half the machine tools in a large department in a plant were painted with the new light gray. The rest of the machine tools were finished with the former darker standard color. Two-hundred watt bulbs used over the new color were found to give the same light intensity as three-hundred watt bulbs used over the old color. Use of the lighter color, therefore, meant that the same degree of visiblity could be obtained —with a 33⅓ per cent cut in lamp size and lighting bill—or a 50 per cent increase in visibility was possible—with no increase in consumption of current. This second possibility—more light from existing light sources—is especially important since it is common experience to find that with better light on a job, production is speeded up, waste and accidents are cut down and **time is saved.**

The attitude of the operator toward his machine, while an "intangible," was a factor which was also considered. Operators take pride in good-looking machine tools, and reveal it in better workmanship and more output. They reveal it also in a disposition to keep the light-colored machines wiped clean and in good order.

There have been some objections to the new color. It shows dirt and fingerprints more easily. It is harder to keep clean. No one understands these objections better than the machine tool builders themselves—for machine tools in machine tool plants are now running as nearly as possible

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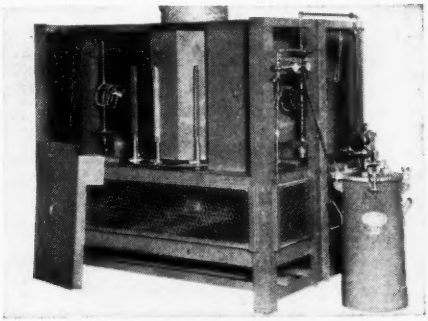

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around the clock, and the job of keeping them clean becomes increasingly difficult. Nevertheless, it was felt that the advantage of the new color outweighed the disadvantages caused by cleaning difficulties.

Lowe Bros. Co. of Dayton, Ohio, has been conducting a series of tests on cleaning methods to be employed on machine tools painted with the new color. This research has been under way in General Motors' Frigidaire Plant and in our own plant in Sidney. As a result of these tests the following recommendations have been made:

An excellent cleaning agent to be used on rags for wiping machine tools clean is made up of a mixture of 25 per cent light lubricating oil and 75 per cent mineral spirits. The mineral spirits used can be Stoddard's solvent, which is a dry-cleaner fluid, or any other standard grade of mineral spirits with a minimum flash point of 105 deg. F. This latter stipulation is necessary to pass the requirements of the underwriters.

On surfaces subject to stain which the above mixture will not readily remove, a spot remover is suggested. Lowe Bros. Co., for instance, make a semi-paste spot remover for this purpose, and other manufacturers no doubt offer similar products.

As a general principle, it should be borne in mind that if the finish on a machine is pyroxylin quick-drying lacquer, the finish is more durable and will stand a stronger cleaning agent; whereas if the finish on the machine is a brushing enamel, a drastic cleaning agent may have a tendency to soften the finish.

The new color as adopted by the machine tool builders has been accepted as "standard" by all divisions of General Motors and Chrysler, the Caterpillar Tractor Company, all U. S. arsenals and navy yards, and by the British Purchasing Commission. Lowe Bros. Co. has been appointed "custodian" of the color, and has been furnished samples of the new color which has also been sent by the Association to all its members.

The new color is available in quick-drying spraying lacquers and also in brushing enamels. Machine tool builders have been authorized to pass on their A-1-a priorities to paint manufacturers, so that no difficulty is expected in obtaining ample supplies of the new color as needed.

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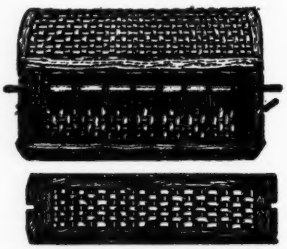
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Finishing Metal Boats in a Yuma, Arizona, Job Shop

By JOS. C. COYLE

CHANGING conditions during the past year or two, including the ever increasing difficulties of getting materials because of the war effort, present a difficult problem for the small business establishment. In some cases, those which have not "put too many eggs in one basket" may find it easier to get along. Some special product or service outside the usual routine may help to mesh with the war machinery and keep the small job shop on its feet.

An example of this may be found in the strategy employed by David Blevins of Yuma, Arizona, who builds all-metal boats as a side line to the routine work of his sheet metal shop. These boats are of a type equipped with air tanks to make them safe in operation and since they are of all-metal construction can be kept out of water indefinitely without the seams opening up. For the purpose of simplifying the description of the operations involved in the manufacture and particularly the finishing of such craft, we will confine this article to one all-metal cabin type boat of original design. An illustration of this boat is shown in Fig. 1.

The all-metal cabin type boat being supported by full sponsons is 15 feet long and 76½ inches over all at the beam. The stern, including spon-

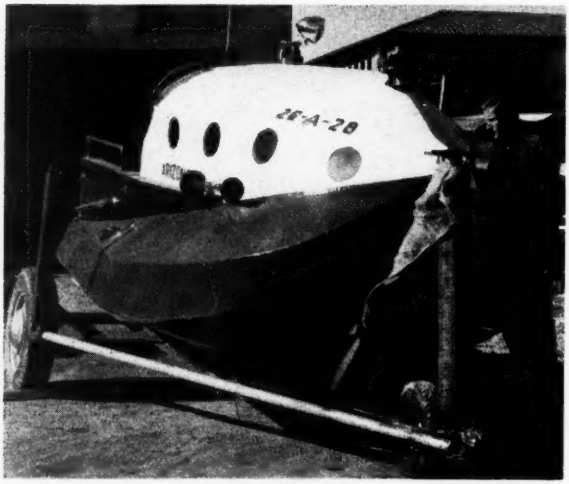

Fig. 1—View of all-metal cabin type boat.

sons, is 42 inches at the bottom and 40 inches at the top. Driven with V-belts by means of a V-8 motor, the boat can be navigated in shallow water at high speed, supported almost entirely by the sponsons.

In the construction of this all-metal boat, 16 and 18 gauge galvanized metal sheets were used throughout. The sheets of galvanized metal were joined with 1 inch riveted and soldered lock seams after being laid out and cut to shape according to pattern. Two pieces were joined to form the bottom with a total length of 16 feet, 11 inches, 23 inches of which was turned up for the stern and a 1 inch flange at its paex.

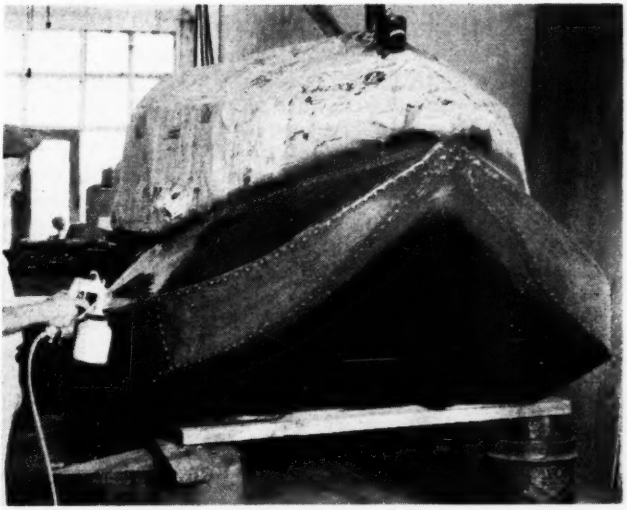

Fig. 2—Spraying the galvanized metal surface with a coating of primer.

The pointed front end of the bottom was bent up to join the side members which are 22 inches in the clear and 14 feet 1 inch long. There is no deck, but the free sides are surmounted by formed channels through which wiring and rudder cables are strung. Cabin walls start with a sheet 12½ inches wide at the front and 16½ inches wide at the rear of the cabin beyond which it projects 11 inches. The front end of these two sheets also join to the turned up bottom. Next, a pointed sheet on each side start the arch of the cabin top, the main sheet of which is 30 by 60 inches, with a long wedge cut back 36 inches and the edges drawn down to join the other sheets and soldered and riveted.

Into the prow is added a formed piece with a cross rod for a hitch. The cabin is completed by a formed sheet 48 inches long on each side of the doorway. These are 12 inches at the bottom and 18 inches at the widest point. The metal door hinges to a section of 2 by 2 angle riveted to the floor, and locks at the top, lying on the floor when open. Along each cabin wall is a seat—and air tank 10 inches wide and 9 inches high. Across the front is a formed shelf for a radio. A similar tank seat extends along each side, aft of the cabin, 5 inches high. Lights inside, over the door, running lights, spot light and grab irons outside, are installed along with four 6 inch round windows on each side, with 8 inch square glass applied inside with metal angles and puttied outside.

Finally, the sponsons and an extension tank on the stern, are applied. A 6-6-3 inch formed channel is applied to the bottom on each side

forming air spaces, and four formed gussets installed on each side sheet. To and over these are applied, in turn, 9 inch by 66 inch sheets, pointed in front; sponson bottom sheets 12 inches wide at the stern, where they form the ends of the rear tank, and 26 inches at the beam. One edge of each is curved to warp into the bow assembly, and they are bent on a brake to slope up to the sponson side sheets. In order to achieve the proper shape, four pieces are used in the forward part of the sponson sides, the two front ones cut on a curve. The main sheet is 23 inches wide where it joins the others and 11 inches at the stern end. It too is braked along a line above the formed gussets.

The boat bottom, between sponsons, is 24 inches wide at the bow and 25 inches at the stern. Above it the stern tank has a depth of 5 inches. The motor is mounted on an angle iron framework resting on the side tanks. With it is used 12 inches of the original drive shaft, with vee pulleys attached, mounted in standard ball bearings. Belts from the pulleys extend to similar ones on a 14 inch section of shafting with universal joint attaching it to the 4 foot propeller shaft. This shaft extends through the bottom at an angle and is enclosed outside by a formed metal housing. The rudder, just aft of the propeller, is on a vertical shaft moving in ball bearings attached to the stern. There is a stern light on a tubular mount at the rear end and hand rails extend from the rear tank up along each side to near the cabin. A 3 x 3 inch angle riveted across the stern carries a hitch ring at the middle.

Since the finish on this and other boats previously built is all important to their preservation, a special effort was made in applying it. Usually acetic acid is used to prepare the galvanized surface for finishing, but dilute sulphuric acid has also been employed for the same purpose. After four hours or more, the surface was wiped off with a rag and a metal primer sprayed on as shown in Fig. 2. After drying for 45 minutes the surface was sanded lightly with 00 paper. Dust was blow off with air and a coat of quick drying lacquer sprayed on, to also dry 45 minutes. This was sanded and the second color coat applied, then rubbed after drying with Acme quality rubbing compound. The surface was then either polished or waxed, as desired. The decks of some models were finished in blue, with gold striping, while such materials were still available. Interiors sometimes received only a coat of primer.

In the case of the cabin boat described above, all rough spots were smoothed off with a Sioux electric sander and buffer and the galvanized surface prepared with acetic acid and the surface wiped when dry. Three coats of red lead were then sprayed on, each drying 12 hours and then being sanded with 00 paper. Followed by three coats of floor enamel, having a rubber base, this procedure was found to minimize scratches due to ordinary handling of the boat. The first two coats were sanded after drying 8 hours. The bottom and sides were finished in red, the sponsons blue, and the cabin top white. The latter was masked while spraying the sponsons.

The 6 inch round windows in each side of the cabin are of 8 by 8 inch square plate glass, applied inside with small metal strips and puttied on the outside. The spray gun used is a No. 6 Craftsman.

As restrictions were placed upon the sale of new refrigerators, jobs of refinishing old metal refrigerators began to come into this job shop. In refinishing these, the old finish is left

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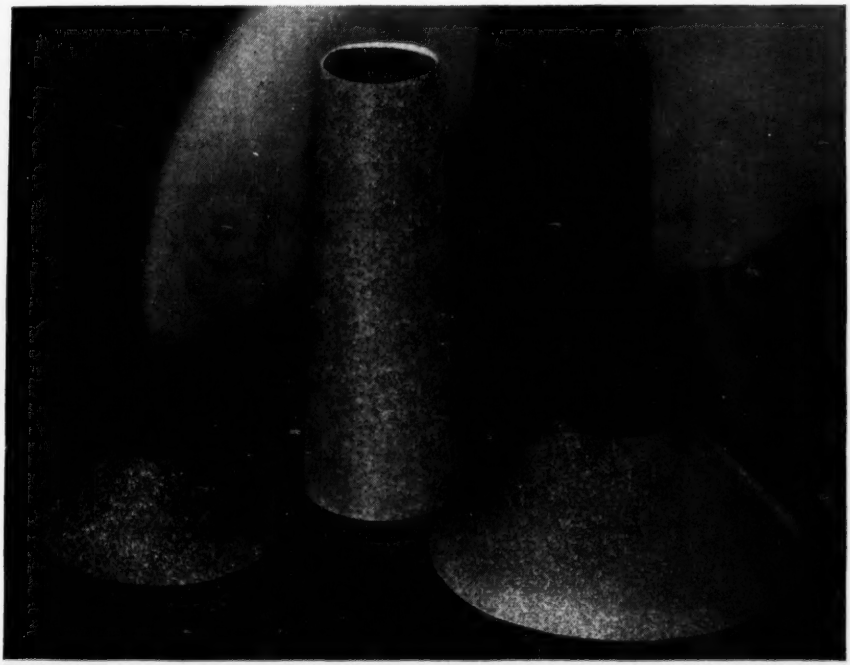

ABRASIVE PRODUCTS, INC. JEWEL ABRASIVES SOUTH BRAINTREE, MASS. U.S.A.

JEWEL ABRASIVES

Made by Abrasive Products, Inc., South Braintree, Mass.

on when it is in good shape and any cracked surface is sanded with the electric sander and buffer. They are then built up with one or more coats of filler, according to the condition of the surface. This is permitted to dry for 1½ hours, or longer. The surface already smooth is sanded and given a coat of primer. The color coats in some cases is lacquer, in other synthetic enamel. The primer used is selected accordingly. In using lacquer the primed surface is sanded and then given four coats, each drying 1½ hours or more in the hot, dry, climate of Yuma and the first three being sanded with 220 paper. Hinges and other hardware parts, if not removed, are masked before starting to spray. In the case of synthetic enamel, only two color coats are used, each drying 12 hours or more and the first being sanded.

Local trucks, usually panel jobs, also come in for refinishing. As a rule these are now done with synthetic enamel. Signs, and so on, are first removed with the disc sander and buffer. Filler and surfacer is applied as on the refrigerators. Lettering is applied by the transfer method, or in some instances turned over to a sign shop.

Indium for Plating

THE development of Indium from the status of a mysterious metallic element to a commercial metal of wide and versatile usefulness to industry has been an achievement of The Indium Corporation of America, 60 E. 42nd St., New York, N. Y. As the result of many years of pioneering research and effort, this corporation today controls patented and perfected processes for the production and use of Indium. This, together with excellent mining properties and available residues, assures that this company will be in a position to amply supply the increasing demands for this modern wear and corrosion resisting material.

Indium is a very soft, silvery metal of the aluminum group and is resistant to the action of air and water. It is softer than lead, possessing a brilliant lustre, is malleable and ductile. Its melting point is 155 deg. C. and it boils at 1450 deg. C. The specific gravity is 7.28.

Indium used as an electrolytic deposit against wear and corrosion, is usually plated onto a base metal and subsequently diffused by low temperature heat treating. The outstanding performance of Indium plated

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non-ferrous metals in resisting acid deterioration, wear, and fatigue has been proved by its increasing use for bearing surfaces in automobile, truck, marine, and aircraft engines.

Indium may be deposited electrolytically by immersing the pieces to be plated in an Indium cyanide bath, using a current density of 0.1 to 1.0 amperes per square inch. The time required is dependent upon the rate of current and the amount of deposition required for protection. The plating bath consists essentially of 4 oz. Indium in the form of a chloride, 2 oz. dextrose, and 12 oz. sodium cyanide.

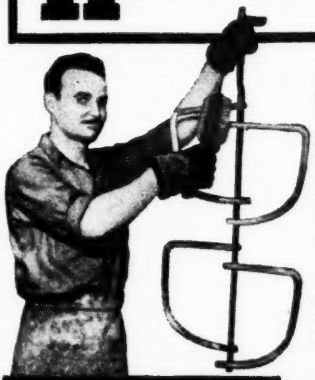
Plated workpieces are removed from the bath and given water rinses. Diffusion is then obtained by heating the pieces to a temperature above the melting point of Indium, and at the same time maintaining the heat long enough for complete diffusion of Indium into the basis metal.

Indium produces on non-ferrous metals a finish which is resistant to oxidation and also capable of taking a high polish. Some of the recommended applications of Indium plating include jewelry, light reflectors, molding trim, and so on.

Indium, combined with non-ferrous metals, produces an effect similar to that obtained by chromium with the ferrous metals. Very small quantities of Indium added to silver produce a marked improvement in color, permanence, and substantially increased resistance to tarnish.

Ernst Magic Drum and Barrel Carrier. The answers to what the Ernst Magic Drum and Barrel Carrier does, how it works, where it is used, and who uses it are contained in a brilliantly illustrated folder now being issued by Ernst Magic Carrier Sales Co., 1456 Jefferson Ave., Buffalo, N. Y. This bulletin gives a complete story of these famous carriers, and their many operating, construction, and application features.

How Metso Cleaners prevent waste



CONSERVE TIME

Platers particularly appreciate how Metso Cleaners help to stretch production time. Metso cuts through dirt, grease and oil on metal surfaces so as to leave them chemically clean. There's no lost time in re-washing caused by incomplete cleaning performance.

Metal parts are quickly ready for further processing or plating. Proper method and quantities to use for your cleaning operation are important, and cheerfully furnished. Free descriptive bulletins on request.

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ECONOMICAL BASIC SOLUBLE SILICATES

Fighting the Fire Bomb

The information contained in this article was prepared by the Safety Research Institute, 420 Lexington Avenue, New York City, N. Y.

MILITARY authorities have not minced words in warning repeatedly that this country must be prepared to defend itself from air attack. The logical aim of war from the skies is the disruption of civilian and industrial life with consequent high-cost-of-interruption to production and morale. And the weapon which it is expected will be used most is the fire bomb.

The first step in preparing against such anticipated attack is a thorough check-up of fire fighting equipment now in place. Alarm and sprinkler systems and fire extinguishers are false promises of security unless they are ready for instant use when danger strikes. Alarming reports of the sabotage of fire extinguishers in different sections of the country emphasize the importance of regular check-ups and a 24-hour guard over all fire fighting apparatus.

Factories, hotels, schools, department stores and many other industrial, institutional and commercial establishments are already equipped with approved fire extinguishers. They can be supplemented by buckets of sand and long-handled shovels. These are the common and safe weapons for fighting the light magnesium incendiary bomb effectively, as demonstrated in "Fighting the Fire Bomb," a training film approved by the Office of Civilian Defense.

As shown in this film, there are two phases to the burning of the magnesium bomb. The first stage is the violent burning of the thermit igniting charge within the body of the bomb, when melted metal and flames spurt for several feet. During this active eruption, which lasts for about a minute, no attempt should be made to approach the bomb. It is important to watch and wait at a safe distance, especially since the bomb may contain an explosive charge which will go off during the thermit reaction.

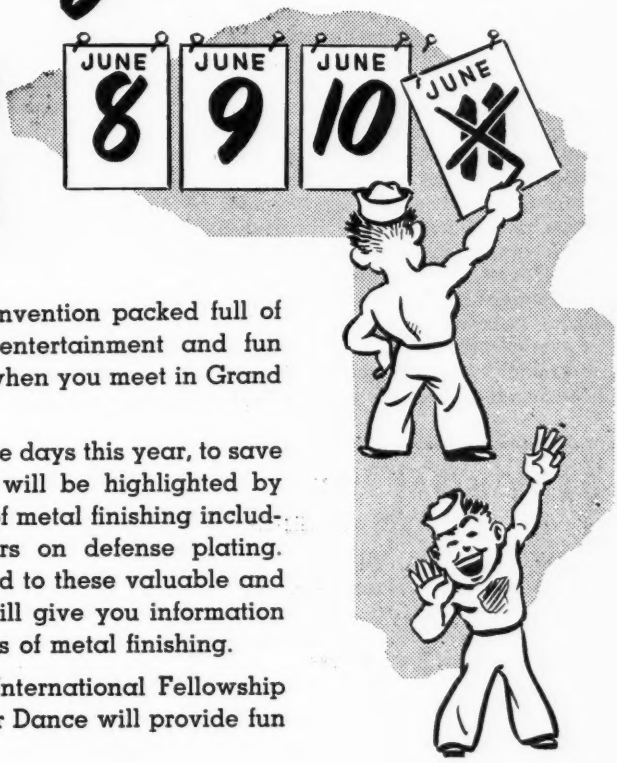
This thermit reaction ignites the magnesium, which continues to burn quietly for ten to twenty minutes, if left undisturbed. In this second stage, the bomb can be approached closely and fought with water spray. At this point, extinguishers enter the picture.

All types of extinguishers discharging water or chemicals dissolved in water can be used directly on the bomb itself, if their normally solid streams are converted into a spray by "thumbing" the stream at the nozzle. These include the pump tank—with or without anti-freeze solution—the soda-acid, foam, loaded stream and gas-cartridge types.

The use of water spray serves two purposes. It speeds up the combustion of the bomb, so that it burns out quickly; it also serves to wet down the area around the bomb and restrict the spread of fire. It will ordinarily require two 2½ gallon units to dispose of one bomb and any

Stripped for Action!

GRAND RAPIDS



A THREE DAY convention packed full of interesting papers, entertainment and fun are in store for you when you meet in Grand Rapids in June.

The Convention, three days this year, to save your valuable time will be highlighted by papers on all types of metal finishing including important papers on defense plating. Four sessions devoted to these valuable and instructive papers will give you information on the latest methods of metal finishing.

For relaxation, the International Fellowship Party and the Dinner Dance will provide fun and entertainment.

AMERICAN ELECTROPLATERS SOCIETY

30TH NATIONAL CONVENTION

JUNE 8 - 9 - 10

surrounding ignited area.

A coarse spray of water helps control the burning bomb; a solid stream causes it to flare up explosively. The solid stream of the extinguishers, however, can be used on fires started by the bomb. Take care to keep the stream away from the bomb itself.

Although only water-filled and water-solution types of extinguishers are effective on the bomb itself, the vaporizing liquid of carbon tetrachloride base and carbon dioxide types can be used on fires started by the bomb, just as they are used on fires started from any other cause.

If the bomb can be approached before it has set fire to its surroundings, dry sand can be used. The sand is shoveled over the burning bomb simply to cut down its radiant heat; sand does not extinguish the bomb. Covered with sand, the bomb can be scooped up in a shovel and dropped into a metal pail, in which a layer of several inches of sand has been placed. By running the handle of the shovel under the handle of the pail, to protect the hands from heat, the sand-smothered bomb can be carried from the premises and dumped where it will burn itself out harmlessly.

To use this fire fighting equipment with maximum efficiency, industrial workers must understand its operation. Approved fire extinguishers should be quickly available in any part of the structure, and every man on the job should know how to use them. Actual fire extinguisher drills are the most effective way to get the "feel" of an extinguisher.

Regular recharging of all fire extinguishers is part of the preparedness program. Frequent inspections are an added precaution against sabotage and give assurance that these protective units are in good operating condition, ready for immediate use.

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Shaw-Box Crane & Hoist Catalogs. Shaw-Box Crane & Hoist Division, Manning, Maxwell & Moore, Inc., 440 Broadway, Muskegon, Mich., has released a series of five catalogs designated as the Nos. 350, 202-B, 203-A, 211-A, and 212. Catalog No. 350 illustrates and describes Shaw-Box "Load Lifter" Electric Hoists, Catalog No. 202-B, Shaw-Box Low Head Room Electric Traveling Cranes, Catalog No. 203-A, Shaw-Box Hand-Operated Cranes, Catalog No. 211-A, Shaw-Box Type "C" Electric Traveling Cranes and Catalog No. 212, Shaw-Box Type "S" Electric Traveling Cranes with roller bearings. Copies of catalogs free to mechanical executives upon request.

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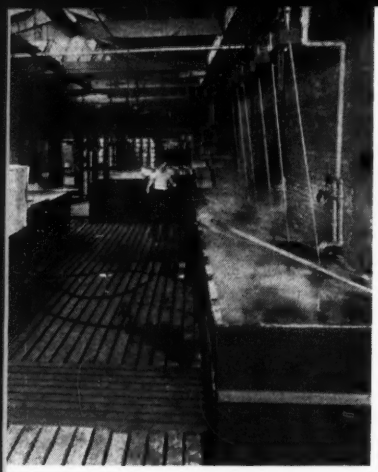


News OF THE INDUSTRY

Doehler Die Casting Co. Awarded Navy "E"

The Doehler Die Casting Co. has been awarded the Navy "E" pennant and the Bureau of Ordnance flag in recognition of its production of ordnance material for the Navy. The company is the first in the die casting industry to be so honored. The award entitles the company to fly the pennant at its plants and its employees to wear a lapel button as public evidence of their accomplishments.

The event was celebrated February 15th at a meeting in the Civic Auditorium, Toledo, Ohio, at which employers and employees as well as Navy officials participated. The firm is a pioneer in employer-employee relations and recently perfected a "no strike" plan for the duration. Doehler Die Casting Company is making more than 1,500 items for the Navy, the Army, and the Air Corps. Notice of the award was received from Secretary of the Navy Frank Knox.

First Annual Photographic Display of the American Electroplaters' Society

The 30th National Convention of the American Electroplaters' Society to be held June 8-10 in Grand Rapids, Mich., will feature the first Annual Photographic Display by this society. Many members and friends of the A.E.S. are interested in photography as a hobby and a great deal of interest has been shown in the prospects of a photographic exhibit at the convention in June.

There will be awards for outstanding pictures in each division. Pictures of past conventions, familiar faces of old friends of the A.E.S., the first generator, or anything else which will help make such a display of particular interest are requested.

The rules are simple. The following tentative divisions are made for grouping: (1) manufacturers' photographs of equipment and processes; (2) photographs of plated parts (emphasis on design and technique); (3) people in activities and occupations, portraits; (4) landscapes, views, gardens, flowers, buildings, architecture; (5) hobbies, table top photography (miniatures); (6) still life; (7) animals.

Further information regarding the photographic exhibit may be obtained by writing to Chester W. Smith, general chairman, 55 Mt. Vernon Ave., N. W., Grand Rapids, Michigan.

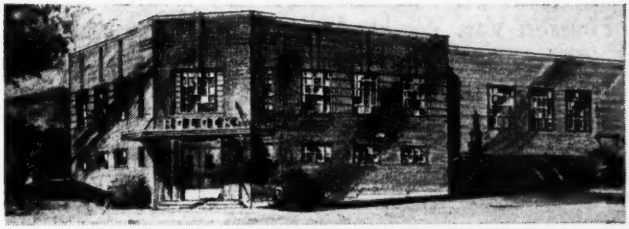
DeVilbiss at New Location in St. Louis

The DeVilbiss Company has moved its St. Louis, Mo., Sales and Service Branch to 2737 Washington Avenue.

This new location with its improved parking facilities will make it more convenient for the trade to take advantage of the services offered by the company's St. Louis branch.

Rolock Occupies New Building

According to a recent announcement, Rolock, Incorporated, formerly of Southport, Conn., is now located at its new quarters at 1350 Kings Highway



New building of Rolock, Incorporated

•

East, Fairfield, Conn. Rolock, Incorporated, manufactures baskets and crates for all industrial purposes such as parts and material handling for degreasing, cyaniding, anodizing, annealing, pickling, plating and so on.

Keystone Carbon Completes Factory Addition

The Keystone Carbon Company recently completed a large addition to its factory in Saint Marys, Pa. The new wing will be used for the manufacture of brushes. A considerable increase in production is predicted.

The company has also laid the foundation for another large plant addition which will house new equipment for making its negative temperature coefficient resistors.

Quaker Chemical Products Corporation Expands

Ground was recently broken for a new two-story manufacturing plant totalling 40,000 sq. ft. on the property of the Quaker Chemical Products Corporation, Conshohocken, Pa. This is in addition to the recent series of buildings which increased manufacturing and storage facilities by 16,000 sq. ft. All the new construction is of stone, concrete, and brick.

It is understood that orders have been placed for considerable new equipment for this new plant. The recently completed units are now functioning normally.

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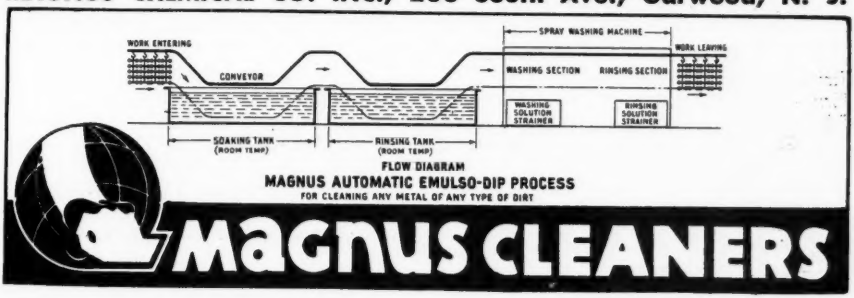
— two variations of the same process which has cut metal cleaning costs to less than one-fourth of those for solvent degreasing in a large number of metal working plants.

• *Write for your copy of this new Handbook, "METAL CLEANING IN WAR TIME" which describes the new process as well as many other up-to-date metal cleaning operations.*

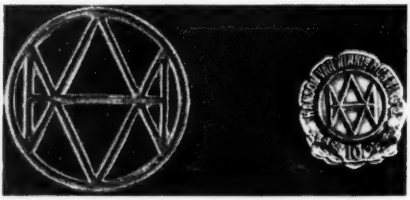
MAGNUS CHEMICAL CO. INC., 208 South Ave., Garwood, N. J.



MAGNUS CLEANERS

Hanson-Van Winkle-Munning Company Insignia Awards for Service

Public recognition for service of employees has been instituted by the Hanson-Van Winkle-Munning Co., Matawan, N. J., manufacturer of electro-



plating equipment and supplies. Service badges have been awarded to all of the employees who have been with the company for five years or more. Various lengths of service are indicated by the different materials used for the badges, although the design is standard throughout.

Women receive the same recognition as men. The men's badges are in the form of a button which fits into the coat lapel; the women's, made up as a pin. Men's badges show the number of years of service.

The materials used for the insignia for different lengths of service are as follows: five years, bronze with numeral 5; 10 years, sterling silver with the numeral 10; 15 years, gold with the numeral 15; 20 years, gold and enamel with the numeral 20; 25 years, gold and enamel, with a diamond instead of the numeral.

The company can well appreciate the value of long service, as its own service to the electroplating industry has been rendered continuously since 1820—a matter of 122 years.

Porcelain Enameled License Plates

Two sales representatives can be credited for an experiment with porcelain enameled automobile and truck license plates in Kentucky. A five-year tag has long been discussed at Frankfort, the capital. But these two men—C. L. Hill of The American Rolling Mill Company and B. F. Birdwell, Porcelain Metals Corporation—created the new porcelain enamel opportunity. Talks

ANNUAL AES CHAPTER MEETINGS

Newark

Time—Saturday, April 11th.
Place—Hotel Robert Treat.
Educational Session—2:30 P. M.
Banquet—7:30 P. M.

Buffalo-Rochester

A joint meeting of the chapters will be held on Saturday, April 18th at the Hotel Seneca, Rochester, N. Y.

The educational session will start 2:00 P. M., and the speakers will be *Gustaf Soderberg*, Udylite Corp., Detroit, Mich., *W. A. Helbig*, Darco Corp., New York, N. Y., and *R. O. Hull*, Dupont Co., Cleveland Ohio.

Milwaukee

Time—Saturday April 25th.
Place—Schroeder Hotel.
Educational Session—2:00 P. M.

"Some Plating Problems" which will include plating with inside anodes and stripping of deposits. By Gustaf Soderberg, Udylite Corporation.

"Silver and Indium Technic" which will be accompanied by a moving picture showing some of the processes. By Frank K. Savage, Conn Limited.

"Acid Copper Plating." By Walter Pinner, General Spring Bumper, Division of of Houdaille-Hershey Corporation.

Banquet—7:00 P. M. Crystal Ballroom.

Porcelain Enameled License Plates

with J. W. Hammond, state reformatory warden, and Clyde Reeves, commissioner of revenue, got the two sales representatives a "go ahead." Porcelain Metals made up 100 trial sets of plates from Armco Enameling Iron.

First Combined Meeting Pronounced Success

The first annual meeting of the combined Cincinnati, Dayton, Anderson, and Indianapolis Chapters of the American Electroplaters' Society held at the Indianapolis Athletic Club, Saturday, March 21st, was pronounced a success by the committee in charge of this meeting. An overflow, enthusiastic group of more than 200 metal finishing executives greeted Mr. George B. Hogaboom, Mr. E. L. Lucas, and Mr. Gustav Soderberg, the guest speakers.

Mr. Hogaboom spoke on the subject of "The Past, Present, and Future of Electroplating." His long experience in the plating industry and his present connection as consultant with the War Production Board qualified Mr. Hogaboom exceedingly well in covering the past and the present of electroplating. Mr. Luaces spoke on "Milestones of Progress," a delineation of the contribution of patents to the plating and allied industries. Mr. Soderberg's paper, "Some Plating Problems," dealt with plating with inside anodes and stripping of electrodeposits from iron and steel.

BIAS Buffs have a fast cutting edge

The face on the buff shown above is harder and well suited for rapid cutting down work. Bias Buffs save compound, cost less than ordinary buffs, and do more work.

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The BIAS BUFF and WHEEL CO., Inc.
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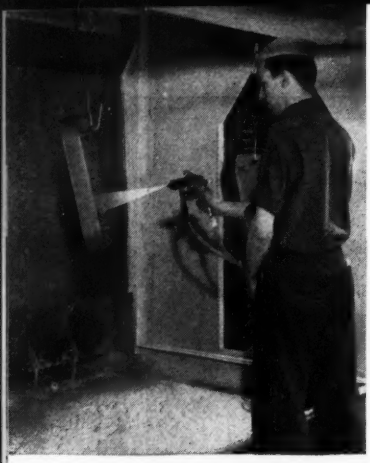


New PLANT EQUIPMENT AND Materials

"NoDrip"

A plastic cork coating which is said to stop dripping from condensation or sweating pipes, walls, ceilings, tanks, and so on, to be known as "NoDrip" has been placed on the market by J. W. Mortell Company, Kankakee, Illinois.

NoDrip can be applied by either brush or spray gun. It can be spread ¼ in. thick over any metal, concrete, brick, plaster, tile, wood, composition, galvanized or painted surfaces, corners angles, or corrugated ceilings. A surface finish of any color can be applied over NoDrip.

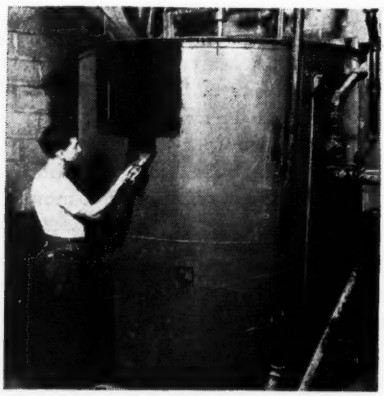


Illustration showing the application of NoDrip to a tank

Miccroil

A new anti-rust oil, known as Miccroil, has been introduced by the Michigan Chrome and Chemical Company, 6340 E. Jefferson Ave., Detroit, Mich. This material has been developed as a rust preventive which will have many applications and combines the best qualities of the most effective oils of its type.

Among its principal qualities is its high flash point. For this reason, the possibility of fire hazard is reduced to a minimum. It dries in 30 to 45 minutes which is extremely fast for a high flash oil. It is light in color, and transparent, and does not alter the appearance of the part on which it is applied. Unlike many other anti-rust oils, Miccroil contains no ingredients which produce a rancid odor.

Miccroil may be applied by hand dipping, and is of a consistency which assures a uniform and extremely effective protective film over the entire surface. It contains 42.5 per cent total solids. Once applied, it is said to provide constant protection until wiped off or removed with a solvent.

In a series of exposure tests, steel panels coated with Miccroil were subjected to corrosive action of acid fumes in a typical plating plant where the relative humidity varied from 92 per cent to 96 per cent at 87 deg. F. At the end of a month, no appreciable change could be seen in the protected surface. No deterioration was shown after 48 hours in a continuous spray of 20 per cent salt solution, with the relative humidity at 96 per cent and the temperature 80 deg. F. No change could be noted after

four weeks of exposure to the weather on the roof of a Detroit plant during the month of January.

Miccroil has been developed so that it may have a number of uses, making possible a reduction in the usual inventories of rust-preventive materials. It may be used on practically any surface which must be guarded from oxidation or corrosion. Aircraft parts, gages, precision tools, other machined or polished parts, stampings, and so on, can be protected with this material. According to the manufacturer, it has been found to be extremely valuable in plating plant use where a corrosive atmosphere is always prevalent. As an example, when the outside diameter of a piece is plated and removed from the plating solution, the inside diameter must be protected from corrosion immediately. Immersion in Miccroil protects the non-plated surface.

Miccroil is supplied in one and five gallon containers and 50 gallon drums.

Osborn Weld Cleaning Brush

A new power-driven end brush of particular importance to war production is announced by The Osborn Manufacturing Company, 5401 Hamilton Ave., Cleveland, Ohio. The new brush is designed particularly to facilitate the cleaning of slag, scale, or oxidation from welds on inside corners, as well as other locations which are difficult of access.

By making it possible to clean such work as thoroughly and quickly as welds which are readily accessible, this new metal-cleaning tool permits still faster output by use of modern welding which is used so extensively in war production.

Developed by Osborn engineers after exhaustive study, research and testing under all conditions of use, this new brush will get into any space which is accessible for welding. It takes no more room to manipulate the brush than it does to weld. The benefit of this facility can be appreciated when it is realized that modern power brushing has speeded up cleaning of readily accessible welds by several hundred per cent over former slow and laborious methods of chipping and scraping. By proportionately increasing brushing speeds for hard-to-get-at welds, the new brush fills a vital need in the speed-up

1-9-4-?

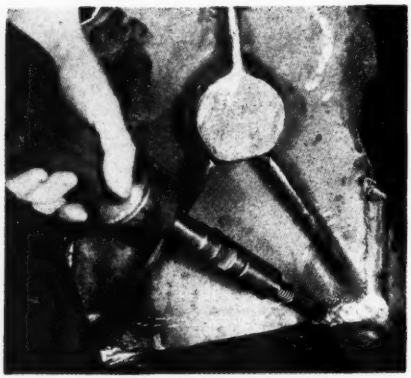
Some year the war will end.
Swords will be beaten back into plowshares, and golf clubs and refrigerators.
There will be a swing back into the things we buy because we like them and not because they are a grim necessity.
You are planning these things now, or should be.
Let us plan with you toward the finish for 194?, whenever it is.
We welcome any call for co-operation on long-range planning for the finish of the future.
Meantime, for 1942 and as far as we can see, we shall do our utmost to supply our customers with the best available materials and service permitted by wartime conditions.

The Varnish Products Co.
5208 Harvard Ave. Cleveland, Ohio

THE VICTORY PROGRAM DEMANDS GREATER

•AUTOMATIC POLISHING & BUFFING MACHINES
Packer-Matic
THE PACKER MACHINE CO., MERIDEN, CONN., U. S. A.

PRODUCTION—MORE SPEED—EFFICIENCY



Osborn Weld Cleaning Brush

program called for by war production officials. Since all welds in war equipment, regardless of their accessibility, must be brushed free of slag, scale, or oxidation, the ability with this new brush to clean the difficult locations as thoroughly as those which are readily accessible eliminates a bottleneck in finished production of warships, planes, tanks, guns, and so on.

An important feature of the new brush is the fact that it can be used in all standard power tools, whether air or electric. This facility is permitted by the special holder which has the additional advantage of permitting instant replacement of the brush part.

The brush proper measures only ½ in. across the end, or brushing surface, and may be obtained with any one of three diameters of wire—.025 in. for Type No. 91-S-2 brush, .035 in. for Type No. 91-S-3, and .090 in. for Type No. 91-S-4.

"MAGIC" TACK RAGS IMPROVE YOUR FINISH 100%

MAGIC TACK RAGS remove specks, lint and sand particles--- bring out that deep, smooth luster, produce a faultless surface for white or colored finish. Why use "home made" tack rags when you can buy MAGIC TACK RAGS at trifling cost! They are tackier, do not dry--- are dust-proof and spontaneous combustion proof. Packed in dozen and gross lots or more. Made only by the

Wm. A. Juergens Co.
4036-40 Lagrange Street,
Toledo, Ohio, U. S. A.
If your dealer does not carry Magic Tack Rags, write us for sample.

Macosol

A metal cleaning detergent composition designed specifically for the removal of oil and grease from metal surfaces using a water emulsion to be known as "Macosol" has been placed on the market by MacDermid, Inc., Huntington Ave., Waterbury, Conn. "Macosol" is said to be entirely neutral in character and thus may be used on aluminum or magnesium without attack on these metals.

In ordinary applications, the recommendations for use in cleaning are to use 10 per cent by volume of Macosol in water at a temperature of 160 to 180 deg. F. For heavy duty applications where chunks of grease and other materials which are difficult to remove are present, it may be necessary to increase the concentration to 20 to 25 per cent. For the heaviest duty such as the removal of carbon and similar deposits the concentration may be as high as 50 per cent Macosol in water. Following the cleaning bath, the work should be rinsed in two hot water rinses or if these are not available, cold water sprays reaching every part of the articles are satisfactory.

A special application is as a rust-proofing compound for iron or steel parts which are ground or machined dry or with kerosene and are subject to rusting. An emulsion of Macosol containing three to five per cent by volume is used for this purpose. A cold solution may be used but the best results are obtained by using the emulsion hot in order that the parts may dry free from water, leaving only a thin, oily film which will not harden. This film may be easily removed at any subsequent time by merely rinsing in water as previously described for procedure following the cleaning operation.

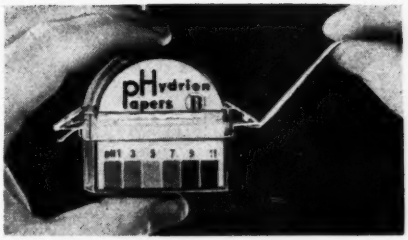
Applications of Macosol include the

use as a cleaner prior to rust-proofing processes and the use to clean and rust-proof steel parts from which the cutting oil must be removed for inspection. In this latter case the parts may be put through the cleaning cycle and allowed to dry without rinsing, thus leaving a thin rust-proofing film which does not interfere with gauging and which is perfectly soluble in cutting oil or soluble oil which may be used in subsequent operations.

For use where the parts have to be brushed in the cleaner to remove the dirt it may be operated cold or at a temperature up to about 115 deg. F. According to the manufacturer, Macosol has no harmful effect on the hands and rubber gloves are not required.

Hydrion pH Papers

Wide range pH test papers are now being marketed under the name of Hydrion by Wilkens-Anderson Company, 111 N. Canal St., Chicago, Ill. Hydrion wide range pH test papers are available in a new convenient dispenser. Types A and B regularly furnished show a distinct color change for each pH unit from pH 1 to pH 11, inclusive, according to the color charts accompanying the dispenser.



Hydrion pH Paper Dispenser

By means of the new dispenser, it is not necessary to open and close the container; a piece of paper can be readily pulled out and torn off to the length needed. The results are said to be accurate to within 0.5 pH units.

Udymatic Piston Polishing and Buffing Machine

The Udylite Corporation, 1651 E. Grand Blvd., Detroit, Mich., manufacturer of electroplating and polishing

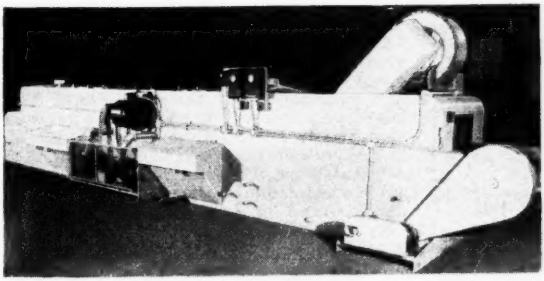
RANSOHOFF *Equipment helps to* KEEP 'EM FLYING

Designed for and installed in one of the foremost aircraft plants, is this Ransohoff Wash, Rinse and Drying Equipment. Here, airplane motor valves are washed, rinsed and dried in one machine—automatically.

Not only is it doing a better job, but it saves valuable man hours, increases production, and reduces costs. A typical example of how Ransohoff Equipment is playing its part in the Victory Program.

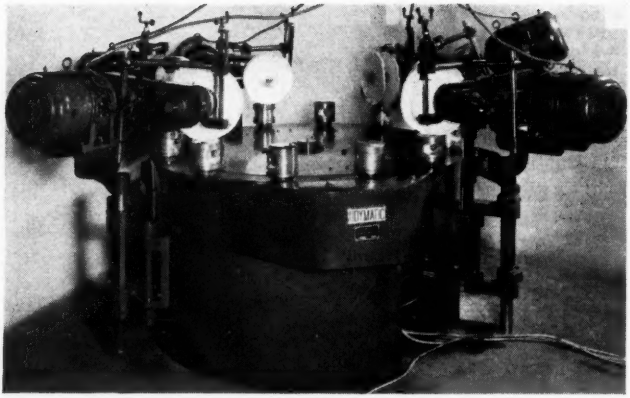
You, too, regardless of what you make, can streamline your washing, rinsing and drying of metal parts, for final finishing, by installing Ransohoff Equipment.

Settle your cleaning problems, today. Use Ransohoff Equipment to meet your specific needs.



Write or wire Dept. "PF" for further information.

N. RANSOHOFF, Inc.
TOWNSHIP & BIG FOUR R. R.
CINCINNATI • OHIO



Udymatic Piston Polishing and Buffing Machine

equipment, announces the development of an automatic polishing machine for buffing aluminum aircraft engine pistons. The machine shown in the illustration is said to buff the sides and top in fifteen seconds.

The machine consists of an index table which indexes automatically. There are 12 chucks to hold the pistons which rotate during the buffing operation. The chucks are stationary during the indexing period and during the loading and unloading. Six buffing pedestals are arranged around the machine to accommodate the buffing wheels which are driven through a "V" belt drive. The buffing heads have the exclusive Udylite feature of "full-float." Buffing pressure is adjustable by means of a tension spring so that the buff rides over the work to provide uniform buffing pressure at all points. The wheels may be adjusted to any angle desired.

One of the principal features claimed for this machinery by the manufacturer is its versatility. The machine may be adapted to a variety of circular parts by merely changing work holding chucks or fixtures. Any buffing adjustment to contact surfaces requires but a few minutes.

With such a machine, one operator is required to load and unload.

IT'S NEW

DRAB-LAC

Lustreless Olive Drab Synthetic Enamel

DRIES like a lacquer but it's not a lacquer
DUST FREE at once
HANDLE in few minutes
PERFECT adhesion
OIL and GASOLINE PROOF
COST inexpensive.

C. H. DRAGERT COMPANY INC.

EAGLE FORD ROAD DALLAS, TEXAS

Service for the West from the West

"Kellin" To Be Used in Manufacture of Wrinkle Finishes

Adaptation of the new tung oil substitute "Kellin" will facilitate the continued manufacture and use of Wrinkle finishes for commercial and war purposes according to an announcement made by New Wrinkle, Inc., 314 W. First St., Dayton, Ohio.

Fears that fast dwindling stocks of tung oil—the hard drying and wrinkling ingredient used in Wrinkle finish—would soon force a serious reduction in the production of these standard varnishes and enamels have now been alleviated.

The adaptation of "Kellin" by New Wrinkle, Inc., now makes it both feasible and economically possible for the first time to produce a satisfactory commercial Wrinkle finish from a linseed oil base. This new formulation was developed and tested within two

weeks following announcement of "Kellin" in the "Wall Street Journal" by Spencer Kellogg & Sons, and in the face of years of varnish manufacturing practice and a general opinion in the paint industry that linseed oil was inferior to tung oil as a base for Wrinkle finish. The new formula was developed by William A. Waldie, technical director, New Wrinkle, Inc., in its laboratory at Dayton, Ohio.

The use of "Kellin" for the production of Wrinkle finish is particularly significant at this time because Wrinkle is specified as standard for many pieces of war equipment, practically all instruments being so finished, for example. It will thus result in the release to other purposes of thousands of gallons of tung oil, a critical material now that importations from the Far East have been discontinued. Its new "Kellin"-Wrinkle formula has been announced by New Wrinkle, Inc., to all its more than 160 manufacturing licensees.

Sherwin-Williams Camouflage Paints

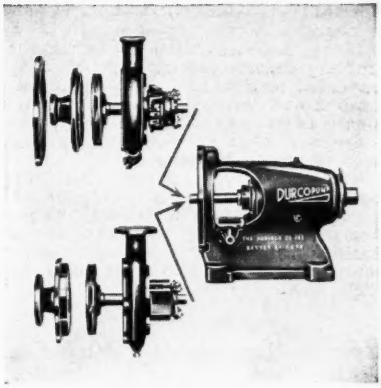
The Sherwin-Williams Co., 101 Prospect Ave., N. W., Cleveland, Ohio, has placed on the market a line of camouflage paints. Concealment of strategic military, industrial or other objectives from enemy aerial cameras or aircraft by making them blend with colors of surrounding earth and foliage is possible with this line of camouflage paints. They are made in 10 colors such as field drab, earth brown and dark green in accordance with color standards established by army experts. They are said to meet with requirements of Office of Civilian Defense.

Sherwin-Williams Camouflage Paints are said to dry without gloss or reflections. They adhere to practically any type of surfaces from glass to asphalt roofing. Paints may be applied by either brush or spray and have moderate durability under exterior exposure.

"Durcopumps"

A new series of corrosion-resisting pumps in which it is possible to get 480 combinations of alloys, types and sizes with heads and capacities to meet practically any requirement was displayed at the recent Exposition of Chemical Industries by The Duriron Company, Inc., 450 N. Findlay St., Dayton, Ohio.

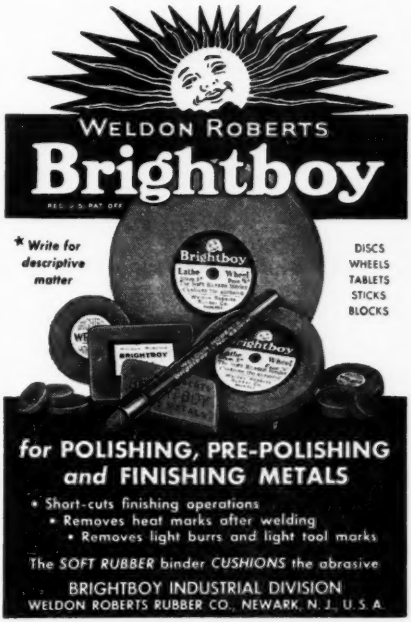
These pumps have a convertible feature said to be obtainable only in these



"Durcopumps"

pumps. Durcopumps that are made in high-silicon irons, Duriron and Durichlor, can be converted to stainless steel pumps simply by substituting only the wet-end parts. The exchange can be made without disturbing the setting of the pump.

This convertible feature is said to be

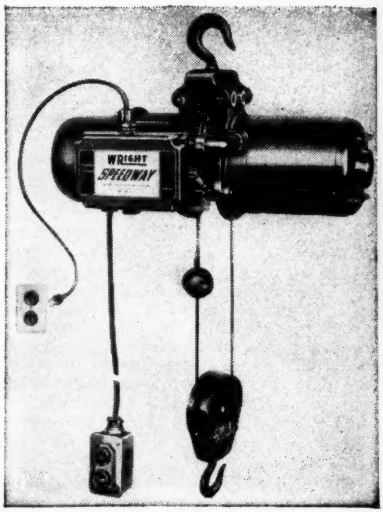


especially valuable where there is apt to be changes in the liquid handled. For instance, a Durcopump of Duriron for handling chrome plating solution can be converted to stainless steel and used to pump alkali washes. This is an additional advantage during the present emergency when delivery on new equipment is apt to be delayed.

Other features include the interchangeability of newly designed open and closed impellers with negative pressure on the stuffing box; oversize ball bearings throughout, and micro-adjustment of the impeller to obtain maximum efficiency.

Wright "Speedway" Wire Rope Electric Hoist

A lightweight, compact, wire rope electric hoist, to be known as the "Speedway," is now being marketed by the Wright Mfg. Division of the American Chain & Cable Co., Inc., York, Pa. The hoist is available in capacities from 250 up to 1,000 lb., and is designed for plugging into a lighting circuit or use with conductor systems. Portability, flexibility, and accessibility are the outstanding features claimed for the unit.



Wright "Speedway" Wire Rope Electric Hoist

Important construction features of the Speedway include push button control; weatherproof, acidproof, dustproof, preformed hoisting cable on drum winding which is said to eliminate slack chain from fouling loads; safety limit switches, and safety load blocks.

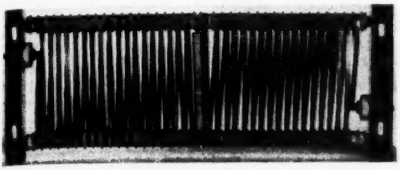
The Wright Speedway Electric Hoist is available for lug, hook, or trolley suspension. When used with trolley, the hoist can be mounted paralled or crosswise to runway beam. The Speedway is furnished for operation on 110 or 220 volt single phase 60 cycle current, also 220 or 440 volt 3 phase 60 cycle current.

RUST-I-CIDE "50"
CLEANS METAL
Easily and Quickly
REMOVES RUST
. . . and provides a foundation for good, lasting finishes.
RUST-I-CIDE "50"
★ Imparts better adhesion by mildly etching.
★ Gives longer life by preventing rusting from within.
★ Chemically cleans—dissolves and *removes* common shop accumulations.
★ Instantaneous action and low cost.
That's why so many companies working on defense orders are using RUST-I-CIDE
RUSTICIDE PRODUCTS COMPANY
Cleveland, Ohio

For a real good polishing job use
KEYSTONE EMERY
TURKISH — NAXOS — AMERICAN
KEYSTONE EMERY MILLS *Write for Sample* 4316 Paul St., Phila., Pa.

Westinghouse Air Heater for Ovens

The Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has placed on the market a heater for heating ovens or furnaces to temperatures of 750 to 1150 deg. F.



Westinghouse Air Heater for Ovens and Furnaces

The unit has a heating element consisting of a one-piece nickel-chrome ribbon, spirally wound around heavy porcelain insulators. Rating is 5 kilowatts for operation on 220-volt circuits. The complete heater is only 2½ in. thick and requires a space 12 by 33 in. for mounting.

Maas & Waldstein Luminous "Blackout" Paint

A luminous "blackout" paint, which can be applied to objects of all kinds and renders them visible in the dark, has been developed by Maas & Waldstein Company, 438 Riverside Ave., Newark, N. J., maker of industrial finishes.

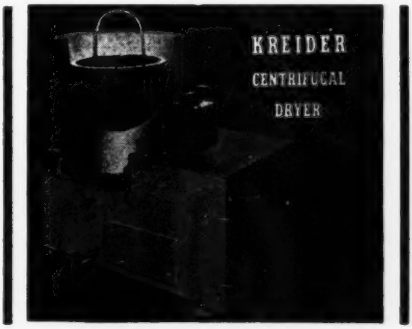
Unlike the radio-active finishes commonly used on watch dials, the new paint owes its luminosity to a substance which re-radiates light, according to the manufacturer. It contains no toxic materials. After the paint has been exposed to either daylight or ordinary electric illumination for a few minutes, it glows for about 20 hours and repeats the action after re-exposure.

The new paint which is known as Durad Luminous Paint, must be used over a special primer and thinned out with a special thinner, both of which are supplied with the paint. One thick coat, or, preferably, several thin coats, of the paint produces a flat white finish suitable for indoor service. For a glossy finish, or for outdoor service, the paint is covered with a special clear top coat. Each coat air dries in from one to four hours, depending upon weather and other conditions.

Scherr "Magni-Ray" Illuminated Magnifier

An illuminated magnifier which can be plugged into any standard 110-volt circuit, to be known as the "Magni-Ray," has been placed on the market by the George Scherr Co., 130 Lafayette St., New York, N. Y. The magnifier has an unusually wide magnification field and provides scientifically correct lighting directly on the object in the field,

Faster, lower cost, quality drying



DRIES ALL TYPES OF PLATED WORK . . . LACQUERS SMALL PARTS

A one-man drying outfit that will speed production, improve quality and reduce costs. Sturdy all steel, electric welded construction. Fully enclosed motor. Fool-proof controls including foot brake and reversing drum switch. V-belt drive, anti-friction bearings. Auxiliary heating unit available.

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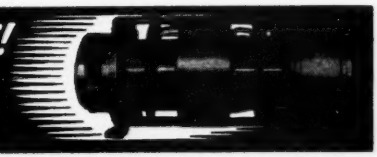
DELLINGER MFG. CO., 729 N. Prince St., Lancaster, Pa.

BETTER PLATING, LESS COST!
"MGC" ELECTROPLATING EQUIPMENT
Write for Interesting Details TODAY!
MOTOR GENERATOR CORP., HOBART SQ. PF-42 TROY, OHIO



thus shutting off reflections.

The Magni-Ray is designed for use in defense industries to quickly detect troublesome and costly sources of delay and waste, such as blow-holes in castings, machine tool beds, tools and dies, cracks in steel after hardening, imperfect welding seams and burrs, and poor finish on small parts, screws, and pins. The instrument is also designed for use in the setting of tools on precision lathes, thread grinders, and watchmaking machinery. In addition, it can be used for the reading of blueprints, fine dials and graduations, maps, and recording instruments.

The Magni-Ray is designed so that it may be quickly removed from its sturdy stand and attached to a machine tool so that work may be watched during operations. The universal angle clamp permits the Magni-Ray to be turned to any angle and raised and lowered quickly for many applications.

The Scherr Magni-Ray Illuminated Magnifier may also be used in laboratories for inspection of instruments and specimens, and for laboratory tests. It is available in two types; namely, Model A with 3-inch lens and Model B with specially designed 2-inch wide achromatic lens with a magnification power of three plus. The three elements in the achromatic lens are produced from highly specialized glass to eliminate distortion.

Scherr "Magni-Ray" Illuminated Magnifier

Despatch Laboratory Ovens

A standard line of small Despatch Ovens designed to fill important needs in the aviation industry has been placed on the market by Despatch Oven Company, 722 Central Ave., Minneapolis, Minn. It is said that many important manufacturers of aircraft, aircraft engines, aircraft instruments, and other products have found that this standard

THE ADIRONDACKS GORE MOUNTAIN CRYSTAL GARNET ORE

ABRASIVE GARNET

For
Abrasive Paper and Cloth
Grinding Wheels
Sand Blast
Minus 300 Mesh for
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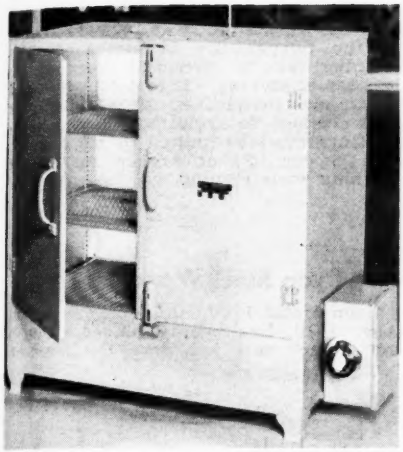


Despatch Laboratory Oven

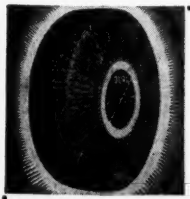
line of small Despatch Ovens fits their needs perfectly for various heating and drying operations up to 400 deg. F. Most of these ovens are in stock available for prompt shipment.

According to the manufacturer, these small ovens are especially desirable for the drying and baking of finishes on precision instruments or for the drying and hardening of radium painted numerals on instrument dials. Finishes can be properly fixed on any parts that are within the capacity of the oven.

Despatch Laboratory Ovens are ideal as drying and baking ovens to dry glyptol dipped coils of various descriptions. It is reported also that these ovens serve as heat control cabinets to store parts and sub-assemblies to prevent rust and corrosion. It has also been reported that these ovens are used for the heating of parts after plating to remove hydrogen. There are, of course, many other standard heating, drying, or baking operations where these units are ideal.

This standard line of Despatch Laboratory Ovens provides three standard stock sizes—the smallest being 14 x 14 x 18 in.; the second, 14 x 14 x 24 in.; and the third, 18 x 24 x 30 in. Electric heating elements are located in the bottom portion of the oven and through the use of an open coil graduated heater system, uniform distribution is obtained. Air flow is established by vent openings in the bottom of the oven and vent openings in the top, the upper ones being provided with adjustable slide dampers. The oven has good uniformity and good ventilation, it is clean and convenient.

Despatch Laboratory Ovens are provided with automatic temperature control that will operate within close limits at any temperature in the operating range. These units are available for operation on 110 volt, single phase, 60 cycle a.c. or they may be obtained for 220 volt, single phase, 60 cycle a.c. While all of these units are of the gravity convection type, Despatch also makes a complete line of standard ovens with forced mechanical convection for forced air circulation.



POLISHING GRINDING WHEELS

Made of

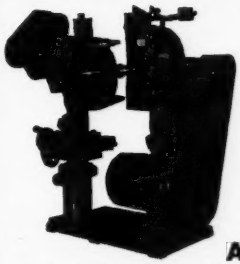
WOOL — COTTON LEATHER — CANVAS

EFFICIENT • LOW COST • PROMPT DELIVERY

ARROW DURA WHEEL, INC.

60 Grand Street New York City

Get Hep to This for Polishing *and* Buffing! *Faster and Cheaper*



ACME

SEMI-AUTOMATIC

and Lathe Combination Unit

One of the many Acme Automatics designed to speed up production and reduce production costs. Send sample for free production estimate.

ACME *Manufacturing Co.*

1642 HOWARD ST. • DETROIT, MICH.

Builders of AUTOMATIC POLISHING AND BUFFING MACHINES FOR OVER 15 YEARS

Matawan AL Cleaner for Aluminum and Magnesium

A new cleaner for aluminum and magnesium has been developed by the Hanson - Van Winkle - Munning Co., Matawan, N. J., manufacturer of electroplating equipment and supplies. This cleaner has been given the name "Matawan AL." It is said to be especially suitable for cleaning parts.

Matawan AL cleaner is designed for cleaning aluminum in either sheets or castings. It may be used for magnesium under the same conditions. Used at a concentration of 4 oz. per gallon at 160 deg. F., it does not produce any etch or weight loss on aluminum sheet or casting after two hours' immersion. Machined and polished magnesium shows no weight loss or etching in 15 minutes or more.

According to the manufacturer, Matawan AL at 4 oz. per gallon and 160 deg. F. has cleaned a mixture of equal parts of kerosene and heavy oil water-break free in 20 seconds. In a number of tests on production castings, the time required was from ½ minute to 4 minutes for thorough cleaning, depending upon the type of work and amount of shop grease present.

This cleaner used at 175 deg. F. will etch the work slightly and slowly; thus, as the temperature is increased, the cleaning rate is increased, but at the expense of etching. It is not to be used as an electric cleaner, it is strictly a soak cleaner. To avoid etching, the temperature must be limited to 160 deg. F. At 175 deg. F. or higher for faster cleaning some etching will take place.

Lyon Steel Work Bench

Lyon Metal Products, Inc., Clark St., Aurora, Ill., has recently placed a heavy duty, steel work bench on the market.

Lyon Steel Work Bench

This type of work bench is said to have a diversified use due to an addition of several new and improved accessories.

The Lyon Steel Work Bench may be equipped with single drawer, two or three shift drawer units for multiple shift operations, half depth shelf, full depth shelf, back and end stops, foot rest, or full length bench riser. Channel type stringer illustrated is used only when bench has no shelf. Shelves and stringer are made in one piece for added strength and rigidity.

CHASE YOUR CARES

Rust and Grease

with

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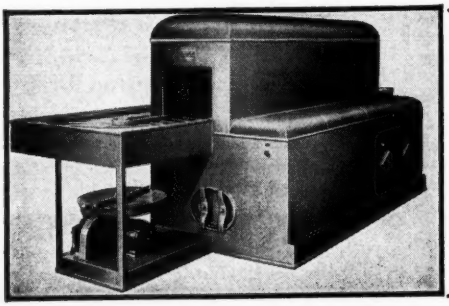
INDUSTRIAL CHEMICAL PRODUCTS CO.

DETROIT

Ft. Wayne **Milwaukee**



HYDRO-FLOW

Industrial Washing Machines

Streamlined design. Hidden motors, pumps and pipes are easily assembled. Piping and nozzles located to insure thorough cleansing of all surfaces. Rugged and efficient pressure pump. Corrosion resistant spray nozzles—from mist to open stream. Monorail, Belt or Gravity type conveyors designed to carry any shape or size material. Variable speeds on conveyor drive synchronize production.

International Conveyor & Washer Corp.

Write for circular.

640 E. FORT ST. DETROIT, MICH.

CM "Meteor" Heavy Duty Electric Hoist

Shown here is the CM "Meteor" Heavy Duty Electric Hoist which is now being manufactured by the Chisholm-Moore Hoist Corp., Tonawanda, N. Y. The hoist is available in capacities of ½ ton and up.

Features of the hoist include streamlined design; aeroplane type cooling fins

CM "Meteor" Heavy Duty Electric Hoist

that quickly dissipate the heat generated by gears and load brake; fully enclosed, weatherproofed design which permits the Meteor to be universally used indoors and out; fully enclosed safety-type hook blocks, and specially designed electrical system which permits only 110 volts to pass through the push button station.

Black-Magic

The Mitchell-Bradford Chemical Co., Seymour St. off Bruce Ave., Bridgeport, Conn., has placed on the market a salt bath operating at 300 deg. F. to be known as "Black-Magic." This bath is said to produce a chemical reaction for coloring all steel, with the exception of stainless, to a rich blue black. This blue black finish is said to be permanent, that it cannot be rubbed off, and will not fade, chip, or peel. The finish imparted to the work is said to become a part of the steel itself and does not change the dimensions of the workpieces.

Originally a development for bluing fire arms, Black-Magic has been adopted by manufacturers in all types of steel fabrications as a reasonably priced, permanent black, possessing substantial rust inhibiting qualities. When Black-Magic is used in conjunction with Witch-Dip, it is said to offer maximum resistance to rusting. Some of the applications of Black-Magic include machine and wood screws, sporting and military arms, metal toys, knife handles, hardware, and so on.

Black-Magic is a combination of chemicals properly proportioned, assimilated and fused, and is available packed in drums of 100 to 300 lbs. Black-Magic is a complete finish where black is desired and provides a bonding surface

RECOVERED TALLOW

An excellent Tallow reclaimed from Harness Leather. This product is unusually high in heat resistance, due to the absorption of the natural chemical properties contained in harness leather.

Write for samples and quotations.

M. ROSS MASSON COMPANY
Dept. P.F.
2160 Montcalm St., Indianapolis, Ind.

HECO BRAND
EMERY

Made from the highest quality selected ores obtainable in this country and in the same careful and thorough manner as imported emeries.

These rough-surfaced, solid-shaped grains hold unusually well in the glue.

Write for full details.

HAMILTON
Emery & Corundum Co.

and a rust inhibitive base for enamel, lacquer, or paint. According to the manufacturer, strip steel or wire may be given several passes through rolls or cuts without affecting the finish and workpieces may be stamped or shaped after application without impairing the black surface.

Black-Magic is said to withstand heat up to 1,000 deg. F. without changing color.

Watson-Standard Rust Inhibitor

The Watson-Standard Company, 225 Galveston St., Pittsburgh, Pa., has announced the development of a new organic coating for black iron which, it is said, can be applied very economically at the steel mill and will result in the solution of many of the coating man's problems.

Watson-Standard Rust Inhibitor is of the oxidizing type. It is said to provide exceptionally fine protection against corrosion and serves as a prime coat for all types of synthetic and oleo-resinous coatings. According to the manufacturer, it will withstand all the usual tests.

Opportunity Section

NEW PRODUCTS WANTED

Will consider developing now for post-war production — can be mechanical or consumers goods. Confidential. Responsible, progressive machinery building and sales organization.

Address P. O. Box No. 1034
Short Hills • New Jersey

An Unusual OPPORTUNITY

For salesmen whose present connections lack security by reason of present business conditions or changes. The offer is to those with a successful record in selling production materials where practical service on application and use of product to their accounts has been a necessary selling requirement.

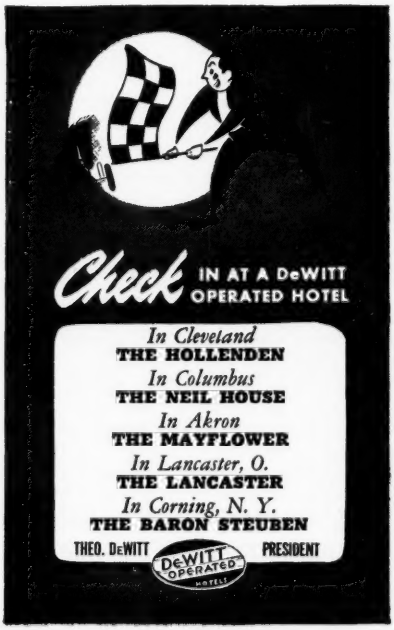
Salary and expenses are offered by a manufacturer with nationally-known products, majority of which are essential to war industry. This company has a 3-A-1 rating with offices and warehouses in principal cities.

Consideration will only be given to those who send in their applications with complete detail showing age, past experience, draft classification, salary expected, etc. Such information will, of course, be held confidential.

Box 99, PRODUCTS FINISHING
431 Main St. Cincinnati, Ohio

This Opportunity Section is available for classified advertisements featuring equipment, employment, business opportunities, etc., in the industries devoted to the cleaning, plating, polishing and finishing of metals. For advertising rates and other information address:

PRODUCTS FINISHING
431 MAIN STREET, CINCINNATI, OHIO



Oakite News Service. How the many steps required in cartridge manufacture vitally affects volume and precision of output in this all-important phase of America's "Battle of Production for Victory," is the subject of an illustrated, five-page feature article appearing in the January-February, 1942, issue of "Oakite News Service," house magazine of Oakite Products, Inc.

Entitled "Cartridge Case Making Rests on Precision Methods," the article concisely describes tank cleaning and automatic washing machine materials and methods employed in the production of cartridge cases for artillery shells and similar types of ammunition. Among the operations discussed in this connection are cleaning between draws, pickling and washing after annealing, cleaning before heading, and cleaning after finish machining prior to mouth annealing. Data is also given on the influence of emulsifying - type lubricants for drawing operations on subsequent cleaning procedures.

Another article appearing in this issue of "Oakite News Service" of interest to production executives is that describing the important part played by proper cleaning of metal parts in facilitating drying and baking with the infra-red process.

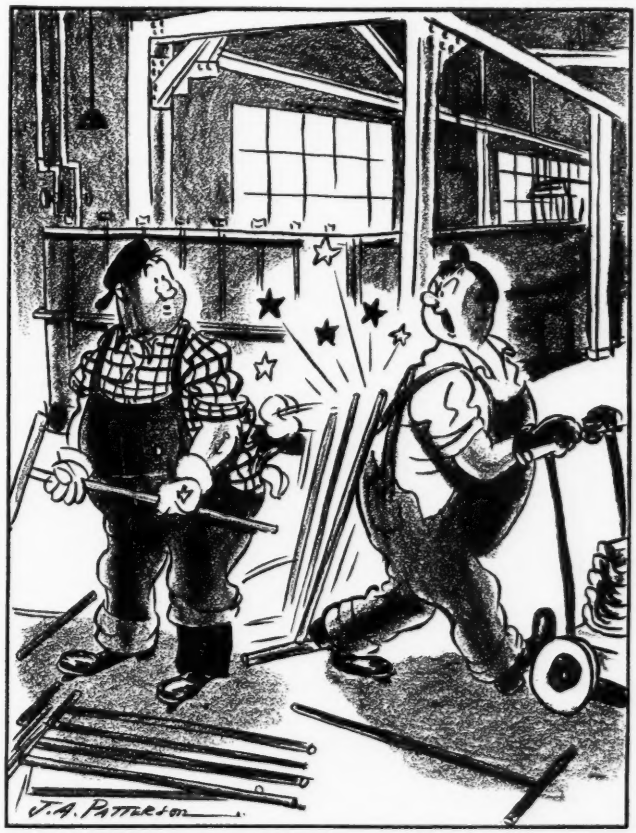
Copies of this issue of "Oakite News Service" are available upon request to Oakite Products, Inc., 20 Thames St., New York City.

Mention PRODUCTS FINISHING when writing to advertisers.

Cratex Rubberized Abrasive Wheels and Points for fine grinding and polishing are the subject of a four-page illustrated and descriptive folder prepared by the Cratex Mfg. Co., 81 Natoma St., San Francisco, Cal. Copy free upon request.

Our soldiers, sailors, and marines need planes, ships, tanks, ammunition, uniforms, and food. You can help to supply them by buying Defense Savings Bonds and Stamps.

The Finishing Touch — ***By J. A. Patterson***



"Alright, cut out the funny stuff, wise guy."

FOR YOUR Catalog LIBRARY

To obtain copies of the catalogs listed here, indicate on the coupon the number of the item in which you are interested and mail as directed.

1. Alsop Hy-Speed Filter Equipment
A completely illustrated 16-page catalog describing Hy-Speed Filter Equipment is now being issued by the Alsop Engineering Corporation, 8 Bright St., Milldale, Connecticut.

2. Dupor Double Filter Respirator
New 1942 literature and price list on Dupor Respirators is now being issued by H. S. Cover, Station A, South Bend, Indiana.

3. Goodrich Industrial Rubber Conservation Pamphlets
A series of pamphlets on "How to Get the Most Service Out of Industrial Rubber Products" is being published by The B. F. Goodrich Company, Akron, Ohio.

4. American Dustube Dust Collector
A 58-page catalog describing dust collectors manufactured by American Foundry Equipment Co., 555 S. Byrkit St., Mishawaka, Ind., is now being issued by this firm.

5. Burring With the Lea Method
An eight-page bulletin covering the Lea method of burring is now being distributed by Lea Manufacturing Co., 22 Cherry St., Waterbury, Connecticut.

6. Profits in Air
The manner in which electrostatic air filters help industrial plants eliminate losses resulting from contamination of products by dust, smoke, and fumes is described in a four-page folder which is now being issued by American Air Filter Co., Inc., 242 Central Ave., Louisville, Kentucky.

7. Tools for Defense of America
A 46-page catalog describing a complete line of electric tools for defense industries is now being issued by Skilsaw, Inc., 4743 Winnemac Ave., Chicago, Illinois.

8. Industrial Styling with Color
A beautifully illustrated catalog depicting advertisements which have appeared in various magazines on Pittsburgh Industrial Finishes is now being issued by Pittsburgh Plate Glass Co., 2121 Grant Bldg., Pittsburgh, Pennsylvania.

9. Metal Cleaning Tips
The chemical classification and selection of alkaline metal cleaners is contained in a bulletin which has been prepared and is now being distributed by the Cowles Detergent Company, 7016 Euclid Ave., Cleveland, Ohio.

10. Du Pont Speed Brass
The Electroplating Division of E. I. du Pont de Nemours & Company, Wilmington, Del., is now issuing a catalog on the rapid production of smooth, bright brass deposits.

11. Hammond Variable Speed Lathe
A four-page folder illustrating and describing a method by which speed changes of 1,500 to 3,000 r.p.m. can be obtained instantly on the Hammond VRO Polishing and Buffing Lathe is now being issued by Hammond Machinery Builders, Inc., 1622 Douglas Ave., Kalamazoo, Michigan.

12. Black-Magic Products
Five Black-Magic metal finishes are described in a catalog which is now being distributed by The Mitchell-Bradford Chemical Co., Seymour St., off Bruce Ave., Bridgeport, Connecticut.

13. Polishing and Buffing Wheels
The advance line of polishing and buffing wheels for the metal-finishing industry is described in a 28-page illustrated catalog now being issued by Advance Polishing Wheels, Inc., 844 W. 49th Pl., Chicago, Illinois.

14. Park Finishing Bulletin
A 4-page bulletin describing polishing, rubbing, and buffing compositions, and Kold Grip Grain Cement is now being issued by Park Chemical Company, 8074 Military Ave., Detroit, Michigan.

15. Anodizing Aluminum by the Chromic Acid Process
The Mutual Chemical Co. of America, 270 Madison Ave., New York, N. Y., is now issuing a 24-page catalog describing the anodic treatment of aluminum.

16. Corrosion Resistant Chemical Equipment
The Haveg Corporation, 34 Chapel St., Newark, Del., is now issuing an eight-page catalog completely describing its line of plastic chemical equipment.

17. Automatic Painting Equipment
Automatic units and special equipment for air-painting shells, bombs, land mines, fuse parts, and miscellaneous items are described in Bulletin F12-41 now being issued by Paasche Airbrush Co., 1910 Diversey Pkwy., Chicago, Ill.

18. Portable Cleaner
A portable cleaner designated as "3 in 1" for cleaning of dust, grit, filings, and turnings is described in a folder now being issued by Ideal Commutator Dresser Company, 1031 Park Ave., Sycamore, Illinois.

19. Chromium Chemicals
The uses and technical properties of chromium chemicals are described in a booklet which is now being issued by Mutual Chemical Co. of America, 270 Madison Ave., New York City.

20. General Electric Immersion Heaters
Bulletin GEA-3195 now being issued by General Electric Company, Schenectady, N. Y., tells how to heat electroplating baths with General Electric Immersion Heaters.

21. Heavy Duty Grinders and Buffers
The complete line of Marschke Heavy Duty Grinders and Buffers manufactured by Vonnegut Moulder Corporation, 1845 Madison Ave., Indianapolis, Ind., is illustrated and described in a 22-page catalog now being issued by the company.

22. Industrial Washing Machines and Conveyors
A folder telling how seven famous companies solved their product washing problems is now being issued by The Alvey - Ferguson Company, 75 Disney St., Cincinnati, Ohio.

PRODUCTS FINISHING
431 Main St., Cincinnati, Ohio
I am interested in receiving the following literature reviewed in your April issue.

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(Insert numbers denoting literature you want.)

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Company .....

Company Address .....

City ..... **State**.....

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